CONTENTS.

	PAGE
Notes upon Passing Events:—	
Mr. Fowler and Mr. Hawkshaw on Crossing the Channel	445
The Mid-London Railway	446
The *Echo* and the Railway Wants of London	446
The Threatened Strike in the Building Trade	446
Report of the Committee on Patent Laws	446
Educational Census of London	446
Railway Servants and their Hours of Labour	447
Conference of Poor-Law Guardians	447
Circular to Gas Companies:—	
The Chartered Company *v.* The Parish of St. George, Hanover Square	447
The Patent Gas Company	447
The Board of Trade and the Metropolitan Gas Referees	448
Report of Committee on the Municipal Corporations (Borough Funds) Bill	448
St. Petersburg and Viborg Gas Company	448
Provisional Orders granted	448
Correspondence:—	
Patent Gas	448
Symes's Patent Economic Gas Company, Limited	449
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	449
Progress of Bills in the House of Commons	450
House of Commons Committees—	
Doncaster Water Bill	450
Bolton Corporation Bill	453
Legal Intelligence:—	
Court of Queen's Bench—The Gaslight and Coke Company *v.* The Vestry of the Parish of St. George, Hanover Square	455
Campbell *v.* The East London Water-Works Company	458
Miscellaneous News:—	
Metropolitan Water Supply—Metropolitan Board of Works	458
Rugby Gas Company	458
The Gas Supply in Colchester	459
Leeds Town Council	460
Hereford Town Council	460
Dr. Whitmore's Report on the Quality of the Gas supplied in St. Marylebone, in April, 1872	463
Dr. Whitmore's Report on the Quality of the Water supplied in St. Marylebone, in April, 1872	463
Gas Supply of Hull	463
Cheltenham Gas	463
Sheerness Public Lights	463
The New Gas-Generator Company, Limited	463
Dewsbury Town Council—Proposed Purchase of the Gas-Works	463
Peterborough Gas Company	463
Brighton Gas Committee	463
Gas Explosion in the Leeds Corn Exchange	463
Dreadful Accident at the Torquay Gas-Works	463
Claim for Compensation against the Glasgow Corporation	464
Burslem Board of Health	464
Edinburgh Town Council—Liability of the Water Trustees	464
Water Supply of Doncaster	464

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TO CORRESPONDENTS.

X.—*It is an indictable offence for a gas company without statutory powers to break open the public highway for the purpose of disconnecting a service-pipe.*

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 21, 1872.

Notes upon Passing Events.

A COMMITTEE of the House of Commons have passed the preamble of a Bill for carrying out Mr. John Fowler's scheme of international communication between England and France, without calling on the counsel of the promoters for a reply. Presuming that equal success attends the promoters in the House of Lords, nothing will remain except to finance the scheme. We do not see how the committee could have come to any other conclusion. The scheme was supported by highly respectable engineering evidence, the principal engineer, Mr. Fowler, being certainly one of the most scientific in his profession. The committee were in the position of Sam Weller when he brought Mr. Pickwick's long oration to a full stop with "You offers me half-a-guinea; I accepts." If Mr. Fowler's clients should lose their money or never subscribe it, or the French Government refuse their co-operation, no one but the speculators will be damage, except in an indirect sense. But this House of Commons success has brought into the field of controversy Mr. Hawkshaw, whose name stands even higher than that of Mr. Fowler; in fact, no name inspires so much confidence as Mr. Hawkshaw's when he actually commits himself to an estimate. Lord Bacon says there is a wise and a foolish spirit in every man, and Mr. Hawkshaw appears to be an example of this axiom. He has two schemes, one for a cheap, easily-constructed improvement of the Channel passage; the other for a tunnel—a scheme we have never hesitated to term, if not Utopian, too costly for commercial consideration. Mr. Fowler, with characteristic ingenuity, passes over Mr. Hawkshaw's feasible plan very lightly, to dissect his tunnel idea in a very few trenchant sentences. He says:

> I felt that although it is possible that a tunnel might be made if sufficient funds were forthcoming, it would be necessary, as a first step, to raise a sum of money to make a small trial, then to raise £2,000,000 to drive a driftway across the Channel, and, finally, to raise £10,000,000 to make the tunnel.
>
> It is probable that the money required might be found for the first step, and that the small trial might be made; but I did not believe, and do not now believe, that £2,000,000 will be provided for the second step, or driftway, and even if the money were forthcoming the driftway would, in my opinion, occupy ten years.
>
> Suppose, however, that the £2,000,000 were provided, and the driftway carried out, I think it most improbable that £10,000,000 would be found for the final step.
>
> In the meantime, what is to become of the present and the next generation?

And there we agree with him; but when Mr. Hawkshaw comes to dissect Mr. Fowler's plan, he makes out a case which will carry with it the sympathies of commercial men. Mr. Fowler proposes to construct a new harbour on the French coast at Andreselles, and a new harbour at or near Dover, to accommodate enormous two-tiered steam rafts, on which railway passenger carriages are to be run below, and railway goods trucks above. The cost of all this must run into many millions. As for the results, supposing the harbour is a success, we will leave Mr. Hawkshaw to speak:

> What about the passenger carriages to be ferried across the Channel?
>
> Simply for the purpose of retaining seats and keeping the "small things" together. The "small things" could only apply to umbrellas and rugs, as every one acquainted with foreign Customs-houses knows that articles down to ladies reticules have to be taken out of the carriages and exhibited to the Custom-house officers. It is treated as ludicrous by the promoters of the International Bill themselves that any one should ever have supposed that it was any part of their intention that passengers should sit in the carriages during the crossing, and I quite agree with them. But then is it worth while to ferry trains of passenger carriages across the Channel for the sake of "the small things," the rugs and umbrellas—even these will be taken out of the carriages by those who like fresh air, and wish to be on deck—or is it for the sake of retaining seats? I, who cross the Channel very frequently, prefer to change my seat after crossing, unless I am very sure of my neighbours, and find they have not suffered from sea sickness during the crossing. Moreover, on continental railways they are in the habit of packing people more closely than we do, and this preordained fixture of position in the train might prove anything but agreeable.
>
> It has been stated by the promoters of the International scheme that there would be a saving in time of two hours between London and Paris. How? By performing the Custom-house duties during the crossing, and by the increased speed of the boats. There could be no other saving of any moment.
>
> With regard to a Customs examination on the unsteady deck of a vessel (and vessels of the size proposed will be unsteady in rough weather), I will leave it to those accustomed to cross the sea to say how far it would be agreeable to them to be called upon during the Channel passage to attend with their keys and to devote their time to such an occupation—a duty of which many would be quite incapable.
>
> Moreover, were I wrong in this, boats of the size of those at Holyhead, which are 350 feet in length, being unencumbered with passenger carriages, would have more room for cabins and Custom-houses than the proposed boats of the International Company, with passenger carriages and goods trucks aboard; for in summer the trains already arriving at Dover by the two routes number at times 32 vehicles. If all these were to be ferried across the Channel there would be little room to spare for cabins or for Custom-houses; but if the traffic is to be increased, as I think it would, by improved accommodation, the trains would be still larger, and the difficulty of providing for them would become much greater, and the space left for other conveniences would necessarily be less. But it would seem as if the promoters of the International scheme were somewhat afraid of their own proposition, and, like Collins's "Fear," recoiled from their own noise, as they have urged the committee before whom their Bill went to permit them to use boats 400 feet long instead of 450 feet, and to provide accommodation for 16 carriages only.
>
> The advocates of these very large boats appear to me to overlook the fact that in winter the Channel boats frequently carry only 50 passengers. It is true that they propose in the same boat to carry laden goods waggons as well as passenger trains. But I have already pointed out to those whom it concerns—namely, the railway companies—that it would be more convenient and more economical to carry goods waggons (if they wish to do so) from the floating docks on each side of the Channel, and this might be done in nine months from the present time, at a cost not exceeding £140,000.

Mr. Hawkshaw's plan is to provide boats of the length and breadth of the Holyhead mail steamers, with a less draught, "8 or 9 feet would be sufficient." Four such boats would cost £300,000. "They could run from Dover Admiralty Pier to-"morrow." On Dover harbour works he would expend £260,000, and would undertake to make sufficient preparation for such boats at Calais for £200,000. The total cost would, therefore, be £760,000. The time required for the preparation and execution of these improvements would not exceed twelve months. We have not met any one of authority who believes that Mr. Fowler's scheme could be executed in three years—it might take seven years. As for its cost, all estimates are founded

on the absence of accidents. But unforeseen accidents always occur in creating new harbours. Then there is the cost of fortifications, for which, at this time, France has no spare money. Obviously, the wise course would be for the railways interested in this Channel passage to raise the trifle of three-quarters of a million, and lend the French authorities, at a fair rate, the capital required for the alterations at Calais.

The House of Commons committee have rejected, or rather suspended, the western portion of the Mid-London Railway—*i.e.*, from the Marble Arch to Commercial Road East, on grounds with which it is impossible to find fault. The committee admit the usefulness of the projected line—that it will be carried out with a minimum disturbance of property—that the new street which forms part of the scheme is one which must be made "sooner or later"—but they ask the question which we asked when the project was first brought before the public—Where is the capital to come from? The Metropolitan Board of Works, to its eternal disgrace, opposes this gigantic improvement in metropolitan communications because the formation of the new street will not be under the control and add to the glory of the Board. The Corporation have not the pluck either to assist the scheme with a liberal subscription, or to boldly come to a compromise with their rivals at the Board of Works. Yet nothing would so help to support the fading influence of the Corporation as the execution of this grand street improvement.

The *Echo* is a paper which rivals its giant cotemporaries in the ability of its literary department, and the accuracy of its political information, yet it seldom touches an engineering question without committing some gross blunder in fact or argument. Writing on this Mid-London Railway question the other day, the *Echo* complained incidentally of the incomplete condition of our metropolitan railways, and said that a "Baron Haussmann would have 'had a circular railway for London long ago." Now, in the first place, if everything the inhabitants of the metropolis eat and drink, from a carrot to an ox, from a barrel of small beer to a pipe of Amontillado, from a bunch of larks to a haunch of venison, were taxed for municipal purposes, there would be an enormous revenue available for a great many public works, even without the vast debt with which the Baron has saddled the good city of Paris. In the next place, as a matter of fact, the metropolis of London is about ten times as well provided with urban and suburban railways as Paris. We write with railway maps of the two cities before us. Paris has a circular railway, following the line of the forts, constructed for purely military purposes. The average distance of this railway from the centre of Paris is over five miles, the only exception being a branch to the Champs de Mars. Even the stations of the six great French railways are all outside the city. If the writer in the *Echo* will invest twopence—that is to say, one penny in a time-table of the London and North-Western, and another in one of the Metropolitan, he will find that London has an outer circle which will shortly be connected through the Thames Tunnel, and an inner circle which is only separated by the short distauce between the Mansion-House station and Moorgate Street; that all our great railways but one have stations in the heart of the City and at the West-end. We need not say more on a subject which any one may exhaust by purchasing the time-tables of the railways which are either purely metropolitan or have termini in London. The writer in the *Echo* only echoes an old dream of desk philosophers. He wants to combine the advantages of central despotism with the energy of private enterprise. The thing cannot be done. The Manchester Chamber of Commerce, in a resolution against the purchase of railways by the Government, observes on the "inelastic" character of Government management. "Inelastic" is a very correct and suggestive word. We have never met any advocate of state railways who could answer two questions we have put more than once. At what date, in what year, would it have been well for Government to have superseded private enterprise? To what department would these pseudo-reformers commit the management? To the Admiralty, or a department of the War Office? To the Works and Buildings, under Mr. Ayrton? or Woods and Forests, under Mr. Gore? Or to the defaulting management of South Kensington?

The building trade of London are about to strike for nine hours work and ninepence an hour. If the demand justifies the claim, they are quite right. But that is not the ground on which they put their request. On the contrary, they say, what is quite true, that many mechanics have been out of work for some time. Why? Because building is a bad trade. Building land in many situations near London has actually fallen instead of rising in value within the last three years. Every week building estates are put up at the mart and withdrawn for want of one acceptable bid. The idea of the building mechanic is to make more employment for more men by each man doing one hour's work less per day, and yet that each man shall receive more wages than if he worked ten hours a day. This scheme will answer if there is a great demand for building work, but if there is not any more than at present, the condition of the trade will become worse. All materials—timber, iron, glass, slates—have risen in price. Advances of money cost six and seven per cent. The rise of wages will deal a severe blow to the class on whom the trade are most dependent—the speculators—the men of great enterprise and little capital, who take an estate of grass fields and turn it into a town of villas. As for the builders with capital, they will retire from a business which has become so uncertain, or confine themselves to a few great works which can be carried out without going into the market for new hands. The opening of some of the suburban lines will cause a certain demand for small houses for workmen and clerks. Of course short hours and increased wages will raise rents; but, after all, the question must be settled by supply and demand.

The select committee on Patent Laws have reported in the form of a series of resolutions, carried, we believe, against a minority of Mr. Macfie and one other Scotch manufacturer. Of these resolutions, sixteen in number, the following are the more novel and important:—

4. That it does not appear that the granting of pecuniary awards could be substituted, with advantage to the public interest, for the temporary privilege conferred by letters patent.

5. That the existing Patent Law of this country and its administration are in many respects defective, and require considerable improvement in the interests of the public, of manufacturers, and of inventors.

6. That protection for a limited period, and dating back to the time at which it is applied for, should only be granted for an invention on its nature and particular points of novelty being clearly described in a provisional specification, and upon the report of a competent authority that such invention, so far as can be ascertained by such authority, is new, and is a manufacture within the meaning of the law.

7. That letters patent ought not to be granted for any invention so protected until the provisional specification has been open to inspection, nor until a complete specification has been deposited fully describing the means of carrying it into effect, and such complete specification has been found by the same authority to accord in all essential particulars with the description of the invention in the provisional specification.

8. That all letters patent should be subject to the condition that the manufacture shall be carried on within the United Kingdom, so as fully to supply the demand for the same on reasonable terms to the public, and with due regard to existing interests.

9. That letters patent shall not be valid for an invention which has been in use in a foreign country, unless a patent for the same shall have been granted in such country, and unless such letters patent shall have been granted in this country to the original inventor, his assignee, or authorized agent.

13. That the present condition of the Patent Commission is open to serious complaints.

14. That the Patent Law Amendment Act of 1852 provided that the commission should consist of certain *ex officio* commissioners—viz., the Lord Chancellor, the Master of the Rolls, and the law officers of the Crown for England, Scotland, and Ireland, together with other persons to be appointed by the Crown, but no such other persons have ever been appointed.

15. That the Lord Chancellor, the Master of the Rolls, and the two English law officers are now the only commissioners, and by reason of their other engagements it is very difficult to get a meeting of the commissioners, and practically an officer in the Patent Office does the duty of the commission.

16. That the law and its administration are defective—

(*a.*) They admit of protection, and, subsequently, of a patent being granted for an invention which is not properly the subject o, letters patent, not being a manufacture, or, being a manufacture is not new, and of patents being granted for the same inventio to several contemporaneous applicants.

(*b.*) They offer no guarantee against patents being used solely or chiefly for the purpose of obstruction.

(*c.*) The facilities afforded to an intending patentee for ascertaining whether his invention is new are insufficient.

(*d.*) The time, trouble, and expense involved in proceedings affecting the rights of patentees and of the public are excessive.

17. That the following alterations of the law and of its administration are desirable:—

(*a.*) That protection be not granted to any invention except on the report of a competent person or persons that the conditions of Resolution 6, as to such protection, are fulfilled.

(*d.*) That all trials of patent causes should be before a judge, with the assistance of skilled advisers (who may be Commissioners of Patents), and, as a rule, without a jury; but with power for the court to order a jury for the ascertainment of facts in exceptional cases requiring the same.

(*e.*) That the commissioners be reinforced by the appointment of competent persons of legal, scientific, and technical experience, whose time is not occupied with other engagements to such an extent as to prevent their giving full attention to such administration.

(*f.*) That the commissioners shall make rules, relegating to some of their body, together with competent assistants, among other duties, that of ascertaining as to every invention for which a patent is sought to be obtained whether it is properly the subject matter of a patent, whether its nature and the particular points of novelty have been clearly described in a provisional specification, and whether, so far as can be ascertained by them, it is a new invention; and, as to the complete specification, whether it fully describes the means of carrying the invention into effect, and accords in all essential particulars with the description thereof in the provisional specification.

(*g.*) That all letters patent should contain the following conditions not usually inserted therein—viz., that the manufacture be carried into effective operation within a reasonable time, within the United Kingdom, by the patentee or his licensees, so as to supply the demand therefor on reasonable terms; and that licences be granted by him to competent persons on fair conditions, as well as the fact of competency, to be determined in the event of disagreement by the commissioners, due regard being had in such determination to the exigencies of foreign competition.

The report of the School Board educational census for London

shows that in a population of 3,265,000 there are 681,100 children between the ages of three and thirteen. Out of this number there were 176,000 who ought to be at school; and of these 80,300 have no excuse for not being at school.

In the metropolis there are 1149 efficient schools, accommodating 312,925 scholars, and 250 schools efficient in building or instruction alone, accommodating 37,995 scholars, *i.e.*, in the whole, 1399 schools completely or partially efficient, with a total accommodation for 350,920 scholars.

From the total number of children between the ages of three and thirteen years, the Board first deducted those requiring a higher class of schools and those in institutions. From the remainder, which were now limited to those who should attend elementary schools, they then deducted the ill, the disabled, the children under five years of age, whose parents pleaded they were too young to attend school, and half the children at work. The result gave 478,718 as the total number of children for whose regular absence from school no valid excuse could be alleged. The Board then made a further and final deduction, viz., on account of probable temporary absences. Returns for thirty of the largest schools in London induced the Board to deduct 5 per cent. On this basis of calculation there should be school accommodation for 454,783 children in average attendance, and, as it exists for only 350,920, it follows that there is actual necessity to provide school accommodation for 103,863 children in average attendance. Though submitting their statistics to the department with the conviction that the conclusions arrived at are as accurate as can reasonably be expected, the Board do not propose that the whole of the required school accommodation be provided at once. But they urge *immediate provision* of schools for 100,600 children in the whole area of the metropolis.

In the City of London there is an excess of accommodation of 1418, but this we suspect arises from the existence of ward schools, which are conducted on exclusive principles, for the report adds:—

But a subdivision of it shows a deficiency of 673, which none of the excess is available to balance. The Board have accordingly arranged that a school for 1100 children, to be erected in a neighbouring subdivision of the Tower Hamlets, shall provide for 500 of these children. In Chelsea the deficiency of accommodation for 3272 children; but, for reasons stated, it is proposed to provide schools for 4900 children. In Finsbury the deficiency is 13,135; it is proposed to provide immediately school accommodation for 10,600 children. In Greenwich the absolute deficiency is only 3789, though it is proposed to provide school accommodation for 6650 children. The reason is, that the "considerable excess of accommodation in some parts" of this division is not available for the deficiency in other parts. In Hackney there is a deficiency of 22,055, and it is proposed immediately to provide for the accommodation of 20,000 children. In Lambeth there is a deficiency of 22,265, and it is proposed immediately to provide for the accommodation of 18,450 children. In Marylebone there is "a great excess of accommodation," but the "excess" is useless to balance the great deficiency in St. Pancras. Although there is a deficiency of only 3140 on the whole division, the Board deem it necessary to provide school accommodation for 7900 children. In Southwark the deficiency is 12,704, and it is proposed to provide school accommodation for 11,200 children. In Tower Hamlets the deficiency is 23,960, and it is proposed to provide school accommodation for 19,400 children. In Westminster there is a deficiency of 959, and it is proposed to provide school accommodation for 1000 children. "The scheme, however, will have to be reconsidered, and probably abandoned, if Parliament authorizes the creation of the new street to connect West and East London." The conclusions of the Board refer to the spring of last year; since which schools not included in the report have been established.

The question of the hours of railway servants has been brought into useful discussion by the agitation which the great brewer, Mr. Bass, encouraged and headed. But Colonel Rich, one of the railway inspectors appointed by the Board of Trade, has pointed out that in shortening the hours of signalmen and pointsmen, if care is not taken, we may fall from the frying-pan into the fire. Where the hours of duty are reduced to eight or ten, it will be advisable to divide this time into two spells of four or five hours, with an interval of rest, so as not to leave the men with fourteen or sixteen consecutive hours with nothing to do but to sleep. The more energetic will undertake jobs that tire them out before they go on duty; others fall into sottish habits. Many of these men, originally agricultural labourers, read but imperfectly, and have no great variety of books or newspapers to read, if their tastes lay that way. Wherever possible, signalmen should have a not too large garden to cultivate—a useful change from signal work. It is very probable that the success of the railway men in obtaining shorter hours and better pay after agitation, encouraged their kinsman, the agricultural labourer, to follow the same line. About six months ago, in a discussion of the condition of the agricultural labourer at a farmer's club, a county M.P. dilated on the distressed condition of railway signalmen, with the idea of making agricultural labourers contented. He must now suspect that his much applauded and often quoted parallel has had an effect exactly opposite to his intention. The attitude taken by agricultural labourers will, no doubt, eventually lead to an improvement in their condition. The labourer will become more worthy of his hire, and the employer will expect to pay more in wages and less in doles. The movement will assist rational reformers of the poor laws by making the rural classes more independent, and, consequently, less dependent on charity and more dependent on wages.

The yearly conference of poor law guardians was held the other day at Malvern. More than a hundred chairmen of boards of guardians were present. After discussion, some very important resolutions were adopted.

In the end, Canon Melville proposed, and Mr. Lowndes seconded, a resolution to the effect that out-door relief was excessive, and that in-door relief should be made the rule, and out-door relief the exception. This was almost unanimously adopted. The second matter discussed was as to benefit and medical clubs, and was introduced in a paper read by Mr. A. H. Browne, who moved a resolution to the effect that a general provident society was greatly needed, and that the meeting asked the assistance of the Social Science Association in promoting it. The Rev. J. P. Hastings seconded this, saying that there should be a national benefit society on exactly the principles of the Post Office Savings Bank, with aid from the Consolidated Fund; and, after discussion, it was passed. Mr. J. W. Hastings, of the Social Science Association, undertook to bring it before that body. The third paper was read by Mr. Barwick Baker, and referred to the subject of vagrancy. In it he spoke of the change in public opinion in that, whereas some years ago there had to be fought a hard battle with many who held that the vagrants ought to be left to starve, now-a-days all admitted that, whether as a matter of charity or of wise political economy, we were bound to see that every one should have sustenance secured to him, so that he should not have the excuse of possible starvation for his begging, nor the charitable public the same excuse for careless giving. He quoted figures showing the decrease of vagrancy during the last few years, and described the various systems adopted for its diminution; but he gave his belief that vagrancy would never have a really effectual check until there was carried out the measure long advocated by the ablest Poor Law inspectors, and recommended to the House of Commons by Sir Michael Beach—that the care of vagrants should be entirely transferred from the workhouse and the poor-rate to the police and county rate. "Were this done," he said—"were the whole care of the vagrants thrown on one united and disciplined body, did they receive the same treatment at whatever station they came to, and were their progress traced with accuracy from day to day, I have no hesitation in saying that the professional vagrant would in three years cease to exist." In the end, adverting again to the suggestion he had named as being recommended to the House of Commons, he observed that under this system, while every facility would be given to labourers to travel in search of work the life, of an idle vagrant would cease to be a temptation.

Circular to Gas Companies.

More than twelve months ago—so long since that we dare say all but those immediately concerned had forgotten all about it—the Chartered Company brought an action against the vestry of St. George's, Hanover Square, to recover a sum due for lighting the public lamps in that parish. The company contracted for the supply of cannel gas, but as their cannel mains did not extend over the whole of the district, a certain number of lamps were supplied with common gas at a rate of consumption calculated to give the same amount of light as the lamps consuming cannel gas. The parish paid into court a sum sufficient to satisfy the charge for the cannel lamps, but repudiated the sum due for the lamps supplied with common gas, on the ground that the purity of the gas was not equal to the standard imposed by the Metropolis Gas Act, 1860. The cause was referred for a special case to be stated for the opinion of a full court, the main question in dispute being as to whether the Chartered Company in 1870 were under the provisions of the Metropolis Gas Act, 1860. In 1868 the company obtained a special Act, the 109th section of which enacts that—"If the Bill, the short title of which, when passed, "is intended to be the City of London Gas Act (in this Act re-"ferred to as the City Gas Act), now pending, pass into a law in "the present session," as it did, "then the company and their "undertaking shall be subject to the provisions of the City Gas "Act without as well as within the City of London, and the "liberties thereof, and such Act shall extend to the whole under-"taking of the company." Unfortunately for the company, the very next clause enacted that "nothing in this Act contained "shall exempt the company or their gas-works from the provi-"sions of the Metropolis Gas Act, 1860." Now the Act of 1860 fixed the maximum of sulphur impurity at 20 grains per 100 feet, and the City Gas Act, 1868, left the referees to fix a maximum, which, in 1870, they had not done. The opinion of the judges is that while the Act of 1868 imposed additional obligations as to illuminating power, it did not relieve the company from the conditions of purity imposed by the Act of 1860. This decision is so unsatisfactory to the company, that we understand the matter will be taken to a Court of Error.

It was not our intention to have again noticed the proceedings of the Patent Gas Company till the promised reports, now said to have been made, of Dr. Odling and Mr. Keates were published; but an incident, with respect to which our fairness and impartiality are called in question, having occurred, we are unwillingly compelled to break through our resolution in order to relieve ourselves of the imputation at the earliest possible moment.

At nearly ten o'clock on the night of Monday, May 6th, some hours after the Journal for the following day had been made up ready to go to press, a letter from Mr. Mellor, the consulting engineer of the Patent Gas Company, in reply to Mr. Bower's criticism, was delivered at the private residence of the editor. It was, of course, too late to insert it, or to acknowledge its receipt; but it was at once sent to the printers to be put in type, and, but for the extraordinary steps taken by the writer, it would have appeared in our present issue. Mr. Mellor, however, seems to have been unwilling to let the opportunity escape him of manufacturing a grievance, and on the 8th, sent the letter to a contemporary, accompanied by the following note:—"I beg to send "herewith a copy of a letter which I have addressed to the editor "of the Journal of Gas Lighting, but which that gentleman, in "his usual fair and impartial spirit, has not condescended to insert "in his Journal." A messenger from the office of the Patent Gas Company was sent on the previous day (the 7th) to our publishing

office, to inquire how it was that the letter which Mr. Mellor had "*ordered*" to be published had not been inserted, and was, we believe, informed that no such letter had been received at the office, where, indeed, nothing about it could have been known.

Comment on these proceedings is hardly necessary, but we may stop for a moment to point out the strong indications there are that Mr. Mellor was more anxious, as we have said, to manufacture a grievance than to ensure the publication of his letter in our columns. He had a whole fortnight to consider his reply, and yet defers making it until late on the night previous to our publishing day. Everybody, however little acquainted with the conduct of a paper, must know that such a JOURNAL as ours is not like a daily newspaper, sent to press an hour or two before publication, but is "made up" on the previous day; and if a correspondent really desired to have a letter inserted, he would take care to have it delivered at the office at a reasonable hour. To prevent a real disappointment, which we do not believe is felt in this instance, we may mention here that letters intended for publication must be delivered not later than the morning of the day preceding our day of publication.

For the reason stated we do not publish Mr. Mellor's letter, but we cannot pass over the statement in his last paragraph, which we are able to contradict most positively. Mr. Mellor says: "To my certain knowledge there has been no refusal given to "any engineer applying for an opportunity of inspecting the "works at East Barnet since they were ready for the purpose." Now we know that a deputation from the directors of the Alliance and Dublin Consumers Gas Company had arranged to visit the works at East Barnet, accompanied by their consulting engineer, but the presence of the consulting engineer was objected to by the Patent Gas Company, and he did not therefore accompany the deputation.

We are informed that the Board of Trade have notified to the metropolitan gas referees that their appointments will not be renewed at the expiration of their present term of office, which we believe ends in September. By the City of London Gas Act, 1868, and the other Acts which concern the referees, the appointments are made for one year only, but the persons in office are capable of reappointment. We have no knowledge of what the intentions of the Board with respect to the offices may be, but it does not appear to us to be binding on the Board to keep referees appointed.

The report of the select committee of the House of Commons on the Municipal Corporations (Borough Funds) Bill, together with the proceedings of the committee and the minutes of evidence taken, has been published, affording us some interesting particulars as to the discussions of the committee. The number appointed was, as usual, 21, of whom the majority were borough members. By order of the House, five were to form a quorum, but the attendance was unusually good, an average of sixteen being present at each meeting. All the petitions for and against the Bill were referred to the committee; and we learn from this report that the number presented in favour of the Bill was 134, while 145 were presented against it, and 29 in favour of alterations. The first question raised in the committee was the proposal of Mr. Cawley, that it was expedient to receive evidence as to the necessity and propriety of that portion of the bill which proposed to impose burdens on ratepayers in respect of costs heretofore incurred. This was at once agreed to, and seven witnesses were examined, two representatives of the Corporation of Sheffield, in favour of the retrospective clause, and the clerk and solicitor of the Sheffield Water Company against the clause. Four witnesses from Edinburgh were also examined, two in favour of, and two against the clause. A motion made that it was not desirable to hear evidence on other portions of the Bill occasioned a division, in which the motion was carried by a large majority. The committee postponed the consideration of the preamble, and at once proceeded with the clauses. Clause 1 was amended so as to include in the term "governing body" any body of trustees in Scotland having power to levy rates. On consideration of clause 2, Mr. Fielden endeavoured to get the word "promote" omitted, so as to confine the expenditure of public funds to the opposing of measures in Parliament; but, on a division, he did not succeed. The clause was amended by the omission of a part which gave governing bodies power to expend their funds to carry out any proceeding they might think necessary in order to give effect to their functions or powers under any existing Act of Parliament. On clause 3 Mr. Hinde Palmer failed to carry an amendment to leave out the words "an absolute majority of the whole number "of the governing body," in order to insert the words "at least "two-thirds of the governing body present and voting." The clause is much better as it stands, requiring a resolution to be carried by an absolute majority. Subsequently Mr. Palmer proposed another amendment to insert after the words "absolute "majority of the governing body" the words "not disqualified by "law from voting in consequence of personal interest," but the amendment was lost on a division. An attempt was made to omit altogether the proviso which requires the consent of ratepayers to the expenditure of funds in places having a population of less than three thousand; but it failed, as did also an amendment proposed by Mr. Fielden to leave out the words "containing a "population of less than three thousand," which would have made the direct consent of ratepayers necessary everywhere. In the division on this amendment, the numbers were equal, and the chairman, Mr. Hibbert, gave a casting vote in favour of the retention of the words. Clause 4 was amended so as to give ratepayers the right of objecting to the approval of a resolution by the central authority. After hearing the evidence mentioned above, the committee received the statement from Halifax we referred to in our last number but one, and it was thereupon proposed to receive evidence from the ratepayers of Halifax against the retrospective clause. On the assurance, however, that the Corporation of that borough do not intend to seek the benefit of the clause, the committee, on a division, decided not to hear the ratepayers. The committee then proceeded with the consideration of the clause, and a number of amendments were proposed, the most important of which, brought forward by Mr. Stanley, was a proviso that no previously incurred expenses should be allowed, unless it appeared that the governing body had acted *bonâ fide*, and in the belief that such expenses might be lawfully incurred. This amendment was lost by the casting vote of the chairman, Mr. Hibbert. A new clause, proposed by Sir M. Beach, and enacting that the provisions of the Act should not extend to the payment of expenses incurred in the promotion of a Bill for the compulsory purchase of the undertaking of any company which has not during the same session made application to Parliament for an extension or amendment of the powers conferred by its special Act, was also lost by the casting vote of the chairman. Subsequently the preamble and title were amended, and it was agreed to report the Bill. In our last we gave a full abstract of the measure, and now need only repeat our opinion that although some of the most objectionable features of the Bill as originally proposed have been modified by the committee, the measure must still be considered as hostile to the interests of gas and water companies, and, indeed, to private enterprise in general, and likely to lead to a reckless and wasteful expenditure of public funds.

A company has been formed to light the northern suburb of St. Petersburg with gas, and it is proposed to adopt the Patent Gas Company's process of manufacture. The experiment will be interesting, inasmuch as we shall learn what the effect of a Russian winter will be on patent gas.

A second Bill has been brought in by the Board of Trade to confirm Provisional Orders granted to the Cleator Moor Gas Company, the Ossett Gas Company, the Ruthin Gas Company, and the Swinton and Mexborough Gas Company. Abstracts of these Orders will appear in our next.

Correspondence.

PATENT GAS.

SIR,—I have read in the financial papers Mr. Mellor's reply to the letter of mine, which you inserted in the last number of the JOURNAL OF GAS LIGHTING, on the patent gas. I ask your permission to say something further on this subject.

Mr. Mellor says, or leaves it to be inferred, that I have been writing about that of which I am completely ignorant, and that "the directors of the Patent Gas Company have, until now, passed over such criticism as mine, preferring to rest on hard, indisputable facts, on which alone they are content to stand or fall." Mr. Mellor accuses me of being very rash in making assertions, without even troubling myself to inquire into or examine the Eveleigh process at all, and he meets all my assertions with direct negatives, and sums up by saying that by the first distillation in the Eveleigh process there is obtained from Silkstone coal from 7500 to 8500 cubic feet of 23-candle gas, 14½ cwt. of good coke, and from 36 to 40 gallons of oil, or oily tar. Now, I will show who is rash in his statements, and who ought to be particularly careful when he gives figures that they are correct. There is no advocate so bad as one who attempts to prove too much, and this I consider Mr. Mellor has attempted to do. He has, however, not only proved himself incorrect in his figures; but he has proved the correctness of those I gave in my last letter to you. In it I stated that Dr. Eveleigh's patent gas was something like an invention, when he obtained from coal that which did not exist in it, and I call Mr. Mellor forward to prove that such is the case. I will take the mean of the two quantities he says he obtains by the first distillation—viz., 8000 cubic feet of gas per ton of coals—and also the mean of the oil and oily tar, 38 gallons. Of good coke he says it produces 14½ cwt. Beyond this there must of necessity be from 10 to 12 gallons of ammoniacal water, but say 10. Now I will put all these together, and what do you think the weight is? Why 1 ton 2 cwt. 0 qr. 24 lbs. from one ton of coals! Here is the calculation: 8000 cubic feet of

23-candle gas will have a specific gravity of ·600, and the weight of this gas is therefore 367½ lbs., or 3 cwt. 1 qr. 3½ lbs.; 38 gallons of oily tar, weighing 10½ lbs. per gallon = 399 lbs., or 3 cwt. 2 qrs. 7 lb.; 10 gallons of ammonia water, weighing 9¾ lbs. per gallon = 97½ lbs., or 3 qrs. 13½ lbs.; coke, 14 cwt. 2 qrs. 0 lbs.—total, 1 ton 2 cwt. 0 qrs. 24 lbs. I have made no estimate of the quantity of carbonic acid gas and other impurities taken up by the purifying material; so that it is not too much to say that this invention, which in my previous letter I characterized as "wonderful," gives of products by distillation 1 ton 2 cwt. 3 qrs. 0 lb. from a ton of coal! Now I want Mr. Mellor either to explain to me how this result is obtained, or to stand convicted of a "rash calculation," for it not only proves the incorrectness of his own figures, but confirms those I gave in my last letter. Taking the yield of coke at the weight given, and the ammoniacal water as above, I stated that there would be 5000 cubic feet of 20-candle gas and 30 gallons of oily tar, the weight of the gas will be 1 cwt. 3 qrs. 7 lbs., and that of the tar 2 cwt. 3 qrs. 7 lbs.; these added to the ammonia water and the coke come out slightly under a ton.

Mr. Mellor's letter, therefore, only still more convinces me, as I am sure it will many others, that notwithstanding the "careful experiments which he has made in the laboratory, and after the experience he has had of working the system at East Barnet, *that the commercial part of the question has never been gone into at all, and it is that upon which alone permanent success can be established.* It is beyond my comprehension that Mr. Mellor should state such results are "based on the hard, *incontrovertible* facts, arrived at after nearly twelve months careful inquiry and examination into the merits of Eveleigh's system, backed by an experience in the control and management of gas-works of over 20 years, both at home and abroad, and not on the mere hearsay or report of those who know nothing of what they are talking about!"

Now, your JOURNAL is not the place for personal controversy, but I want to know what more an engineer requires than plans and specifications to enable him to form an opinion upon them? Going to East Barnet, and simply looking at the works there, would not assist me one single atom, when I have Dr. Eveleigh's drawings and specification before me, and I think I may safely say that whatever Mr. Mellor's experience may have been, mine has been at least equal, if it have not exceeded his tenfold. However, as Mr. Mellor concluded his letter by stating that to his certain knowledge there had been no refusal given to any engineer interested in gas manufacture desirous of inspecting the works at East Barnet, I wrote on the 10th inst., immediately I saw it, for permission to test the process at East Barnet, of which this is a copy:—

St. Neots, May 10, 1872.

Dear Sir,—I have read in the *Submarine Messenger* of yesterday's date your reply to my letter in the JOURNAL OF GAS LIGHTING on the subject of Dr. Eveleigh's patent gas.

You say, "Mr. Bower, as well as every other person interested in gas manufacture, can, by applying for it, have an order to visit the works;" and as I have an extreme desire to do so, I shall be much obliged if you will give me an order to enable me to make such practical tests as may reasonably be required.

I may say that the only object I have in this desire is to ascertain whether Dr. Eveleigh's system has any value beyond what is at present possible by such modes of manufacture as are free to any of us to adopt.

Writing as I am to a practical man, it is scarcely necessary for me to say that a mere permission to visit the works without an opportunity being given of testing the weight of the coals distilled, the fuel used, and the products obtained, would be of no value. It would require at least two or three days to make the practical tests, and though I can ill afford the time, yet I will give it, if you will give me the opportunity of making these tests.—Yours truly,

(Signed) GEORGE BOWER.

T. Randolph Mellor, Esq.

Up to this date I have received no reply whatever.

Mr. Mellor admits that making gas by the distillation of coal at low temperatures, and the redistillation of the oil or oily tar, is no new thing, but he says no one has ever done it successfully until Dr. Eveleigh performed the feat. Now I have to make an offer, which is this: To erect at my own expense two apparatuses, sufficiently large to give practical results, one on Dr. Eveleigh's plan and one on my own, for which NO patent exists; and if I do not obtain as good results from my far simpler mode of manufacture than from that of Dr. Eveleigh, I will pay the whole expense; but if I succeed, then the Patent Gas Company shall pay it. I am, however, perfectly satisfied that Mr. Mellor has deceived himself, and that the price of the shares is no indication of the value of the process of manufacture, and it will, I am convinced, not be very long before Mr. Mellor will himself be a converted man.

I quite agree with this gentleman that we have all a good deal yet to learn in the way of making the greatest quantity and the best quality of gas from a ton of coals; and what with the high price of coals and of other material, and the increased cost of labour, engineers will have to think more than they have done. But, in my opinion, Dr. Eveleigh's method is not the one which will relieve the gas manufacturer. I repeat what I said in my previous letter—that you cannot have both extreme quality and extreme quantity at the same time; but it is a question whether it may not be advisable to employ some portion of the retorts in distilling coal at a low temperature for the purpose of enriching the gas made at a high heat, instead of using cannel coal. But this can only be settled by a satisfactory answer to the question, "Will it pay?" Whenever we can find an instrument which will register the quantity of *light*, instead of the *volume* of gas, it will then be to the interest of the gas manufacturer to sell *light;* but, until then, he has to sell it by the thousand cubic feet; and therefore, so long as he gives that which Parliament imposes upon him to give, he would be extremely foolish if he gave more, and therefore I do not see what advantage it is to the manufacturer, under such circumstances, to supply to the public gas of such a high illuminating power, by either distilling coal at a low heat, or by an excessive use of cannel coal.

The direction in which the inventor may exercise his ingenuity is, in my opinion, in the substitution of gaseous fuel for coke, somewhat on the Siemens principle, and in an arrangement by which coals may be fed into the retorts in a continuous manner, without manual labour. If this could be effected, there might possibly be the saving which I stated in my last letter.

In conclusion, I may remark that I have no personal interest whatever in the prolongation of this controversy, other than that of gas lighting in general, and I would more readily write in favour of this patent gas than otherwise, if I believed that there was any commercial advantage in it; but at present I do not, and I feel satisfied that in a very short time, when the "hard incontrovertible facts" of which Mr. Mellor speaks are known, as known they will be by the crucial test of time and practical working, the result will be altogether different to that upon which Mr. Mellor has pledged his 20 years reputation.

GEO. BOWER.

St. Neots, May 16, 1872.

SYMES'S PATENT ECONOMIC GAS COMPANY, LIMITED.

SIR,—I have carefully perused Mr. Bower's letter in your JOURNAL of the 23rd of April, 1872, page 337.

It is an admitted fact there are two sides to a feasible argument, but when a gentleman uses the word absurd, he strengthens his adversary's reply, if the adversary convinces the public to the contrary.

I am not personally acquainted with the Great George Street engineer, but I have had the opinion of a practical chemist, who informs me he is correct.

As to your calculation as to price, it has not occurred to Mr. Bower there is coal to be obtained in the north and Midland counties at half the price in London.

I dispute the wear and tear at 6d.

I admit the 1d. for lime.

I admit the 1d. for interest.

I dispute the labour.

One man with this apparatus can make 50,000 feet of gas per week.

I hope Mr. Bower may live many years to see this patent paramount.

In reply to No. 1, I say I can get both quantity and quality.

In reply to No. 2, I say that the gas from this patent does retain its illuminating power, and is superior to the present gas company's.

In answer to No. 3, I use small coal or refuse, and do not require the best gas coal. The gas tar therefrom is valuable, and can be adapted to many uses; for instance, printers ink, with calcined wood.

As to Dr. Eveleigh's process, I consider his invention only known to himself, and no doubt answers his purpose. The shareholders of the company are well satisfied with his purification. My gas does not require any, and will save the public the trouble.

That part of Mr. Bower's letter stating "any system of gas-making which will enable the manufacturer to obtain from ordinary coal *one candle more of illuminating power*, and reduce the cost of the gas in the holder *one penny* per 1000 cubic feet under what is at present possible as it is now manufactured, would produce to the fortunate inventor such an income as most rich men might envy."

I can do all Mr. Bower states, and in the presence of any committee of gentlemen in his presence, and in the presence of each other, that I can save to the consumer 2s. at least—not 1d.—two candles more of illuminating power, and only require Mr. Bower to name time and place in London in one month from this date. Deeds, not words, is my motto.

GEO. SMITH GRAYSON.

7, Hyde Street, New Oxford Street, London.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MAY 6, 1872.

The ILFRACOMBE GAS Bill was reported, with an amendment.

The TONBRIDGE GAS Bill, and the BIRSTAL LOCAL BOARD Bill, were read a third time, passed, and sent to the Commons.

TUESDAY, MAY 7.

The MANCHESTER CORPORATION WATER, and the ABERYSTWITH IMPROVEMENT WATER, &c., Bills, were read a third time, with the amendments, passed, and sent to the Commons.

The BOLTON CORPORATION Bill was brought from the Commons, and read a first time.

The DUNDEE GAS Bill was returned from the Commons, agreed to, with amendments; the said amendments considered, and agreed to.

The GAS AND WATER ORDERS CONFIRMATION Bill was read a first time.

FRIDAY, MAY 10.

The ALTRINCHAM GAS Bill was reported, with amendments.

The LYMM LOCAL BOARD GAS Bill was read a second time, and committed.

The KINGSTON-UPON-HULL WATER, &c., Bill, was brought from the Commons, and read a first time.

The GASLIGHT AND COKE COMPANY Bill was returned from the Commons with the amendments agreed to.

The LOCAL GOVERNMENT SUPPLEMENTAL Bill was read a first time.

MONDAY, MAY 13.

The following Bills received the Royal Assent:—BRISTOL WATER, SOUTHWARK AND VAUXHALL WATER, GLOUCESTER GAS, DUNDEE WATER, SWANSEA LOCAL BOARD OF HEALTH, DUNDEE GAS, and the GASLIGHT AND COKE COMPANY.

The NEWPORT AND PILLGWENLLY WATER Bill was reported, without amendment.

The ILFRACOMBE GAS Bill was read a third time, with amendment, passed, and sent to the Commons.

A petition was presented against the GAS AND WATER ORDERS CONFIRMATION Bill, from Sir Charles Taylor.

A petition was deposited against the BOLTON CORPORATION Bill, from Sir C. H. Tempest.

HOUSE OF COMMONS.

MONDAY, MAY 6.

The BOLTON CORPORATION Bill was read a third time, and passed.

The KINGSTON-UPON-HULL WATER, &c., Bill, as amended, was considered.

The WILMSLOW AND ALDERLEY EDGE GAS Bill was read a second time, and committed.

The LOCAL GOVERNMENT SUPPLEMENTAL Bill was considered in committee, and reported without amendment.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill was read a second time, and committed.

The GAS AND WATER ORDERS CONFIRMATION Bill was read a third time, and passed.

METROPOLITAN WATER SUPPLY.

Mr. KAY-SHUTTLEWORTH asked the President of the Board of Trade what had been done by the London water companies, the Board of Trade, and the metropolitan authorities respectively, under sections 17 to 22 of the Metropolis Water Act, 1871, regarding regulations as to fittings; and how soon those regulations would be in operation, so that application might be made for a constant supply.

Mr. CHICHESTER FORTESCUE: I will tell the honourable member, as well as I can, how the matter stands. The metropolitan water companies have complied with the requirements of the Metropolitan Water Act of last session by submitting a set of regulations, to which they have agreed among themselves, to the Board of Trade and to the different metropolitan authorities. But those regulations will have no force whatever until they shall have been confirmed by the Board of Trade, after an inquiry at which the metropolitan authorities and the water companies have the right of being heard. A circular has been sent by the Board of Trade to the metropolitan authorities whose interests are affected, calling upon them to state objections to any part of those proposed regulations; but the time for receiving those objections has been somewhat extended at the request of the Corporation of London, and of the Metropolitan Board of Works, until the 28th of this month. After that date, when these objections have been received, the inquiry will be held. Of course it is impossible for me to say how long it will last, but the inquiry will necessarily be a lengthened one. When the regulations as the result of that inquiry have been confirmed, the companies will then be required to provide a constant supply after a four months notice, unless the companies can show at any time after the expiration of two months from the time of the notice that more than one-fifth of the premises in the particular district are not supplied with proper fittings. That is how the matter now stands. This inquiry will be held as soon as the objections have been received.

Mr. KAY-SHUTTLEWORTH: Can the right honourable gentleman give us any idea as to how long the inquiry will last?

Mr. CHICHESTER FORTESCUE: I am quite unable to do so.

TUESDAY, MAY 7.

The DARLINGTON BOROUGH SEWAGE IRRIGATION Bill was reported, with amendments.

The WARWICK LOCAL BOARD WATER Bill was reported.

The DUNDEE GAS Bill was read a third time, and passed, with amendments.

The NEWTOWN WATER Bill was read a first time.

WEDNESDAY, MAY 8.

The BRIDPORT WATER Bill, as amended, was considered.

THURSDAY, MAY 9.

The GASLIGHT AND COKE COMPANY BILL.—The Lords amendments were agreed to.

The KINGSTON-UPON-HULL WATER, &c., Bill was read the third time, and passed.

FRIDAY, MAY 10.

The BRIGHTON CORPORATION WATER; WALLASEY IMPROVEMENT; and BURY IMPROVEMENT AND WATER Bills, were reported.

Petitions were deposited against the NOTTINGHAM AND LEEN DISTRICT SEWERAGE Bill, from the Nottingham Gaslight and Coke Company, and the Nottingham Water-Works Company.

MONDAY, MAY 13.

The ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT Bill, and the WARWICK LOCAL BOARD WATER Bill, as amended, were considered.

The NOTTINGHAM AND LEEN DISTRICT SEWERAGE Bill was read a second time, and committed.

The TONBRIDGE GAS Bill, and the BIRSTAL LOCAL BOARD Bill, were read the first time.

HOUSE OF COMMONS.

(*Before Lord* HENLEY, *Chairman; Mr.* MITFORD, *Mr.* W. J. LEIGH, *and Mr.* M'CLEAN. *Referee, Sir* JOHN DUCKWORTH.)

DONCASTER WATER BILL.

(*Continued from page* 436.)

Mr. *Thomas Amory*, examined by Mr. WADDY.

I assisted Mr. Rawlinson in getting the specimens of water. I know the Holroyd Brook. The stream at Holroyd Bridge is formed by two streams, one coming from the sandstone and the other from the limestone.

Mr. *B. S. Brundell*, examined by Mr. WADDY.

I am engineer to the borough of Doncaster. I know the character of the undertakings which they have now on hand, and have had on hand lately. They are fulfilling the whole of the sewage part of Mr. Rawlinson's report, and at a great cost. My opinion has also been taken by them at various times on the subject of water supply. I have considered Mr. Rawlinson's proposition carefully, and in my opinion it is not quite satisfactory. There was nothing to prevent Mr. Baxter or Mr. Bartholomew seeing those plans if they had liked; they were at the corporation office.

Mr. WADDY: Have you received instructions from the corporation to look at the valley of the Holroyd stream?

Witness: Yes; we have discussed it many times.

Examination continued: In consequence of instructions received from the corporation, I have surveyed and investigated the advantages and possibilities of the Holroyd stream. I have examined the streams which form the brook, and believe there is a watershed there where we could get very good water. I have made a valuation of the corporation works, and put them down at £22,295. I have gone into it in detail; it is a fair estimate of their value. I do not think the design of the present bill can be carried out for £60,000. The works alone would cost £68,626. That is without taking into consideration compensation for residential injury to Mr. Boswell, nor compensation to millowners, nor to the navigation. I have included the actual purchase of land, but no compensations of any kind. I have calculated the amount to be paid to us for our existing works, which would be £22,000 more; if not they must put down duplicate mains for supplying the town. Assuming that they did take our works, it would bring the amount up to £90,000 if they bought them at my valuation—that is £10,000 more than even their borrowing powers will entitle them to get. If they lay down duplicate mains instead of purchasing our works, it would cost them £7000 or £8000, instead of the £22,000; that would have to be added to the £68,000, and then there would be compensation. This bill only enables them to take their works to a particular part of the town. There is no doubt their works contemplate the taking of our mains. The works bring their water to the town, but do not distribute it. In order to distribute it, they must either buy our works or put down their own. I heard Mr. Bartholomew read his estimate, but I do not remember that it included anything for estimates in the town. I do not see how it is possible they can have included works in the town. I think this scheme would about double the rates. There is no provision in this scheme for filtration. The water must be filtered. It comes off land, a great deal of which is arable; and, as far as that is concerned, would be very little better than the Don water if supplied unfiltered. Assuming that that is to be done, it would cost more money still. Mr. Hawksley put it at £2500, but I think that is an under-estimate. Putting it at his figure, it brings the estimates to £78,500, without a particle for compensation. £60,000 is the whole they are entitled to spend, according to their estimates. The £20,000 borrowing powers would be for enlarging their works. £60,000 cannot possibly construct their works.

Cross-examined by Sir M. WELLS: No doubt I have received special instructions from the corporation to oppose this scheme. I made an estimate to see if their estimate was sufficient. Mr. Baldwin Latham has been called in to look into this question. I have had no experience with reference to the construction of a reservoir, or as to compensation, but I know the practice well. I have not formed any opinion about the purity of the water supplied by the corporation. I do not like to drink the Don water.

Re-examined by Mr. WADDY: I thought the well water was very good until I heard in this room that it was very bad.

Baldwin Latham, Esq., C.E., examined by Mr. WADDY.

I am a member of the Institute of Civil Engineers. I am in practice at Westminster. The construction of water-works is the branch of my profession to which I have specially directed my attention—that and sanitary engineering generally. I have examined the site of the proposed works at Doncaster, and do not consider they are well devised. I think it would not be wise for the corporation to saddle themselves with this bill. It is not the best way of utilizing the water from that area. In fact, by the scheme proposed, it could not all be utilized. The situation of the storeage reservoir is objectionable. I have very carefully examined the valley both above and below, and there is evidence that the rocks are fissured with vertical fissures, some of them two feet wide. There is no clay on the site except that which has been brought there for the purpose of making the dams for the ornamental fish-ponds. The statement that there is an abundance of clay for making an embankment, and making good puddle, too, I believe to be a mistake. The whole of the banks are burrowed by rabbits. My estimate for the works, including compensation, except to the mills on the Don, is £110,147 16s.

Cross-examined by Mr. DENISON: I could not pretend to have the local knowledge that Mr. Bartholomew has. I have Mr. Rawlinson's estimate, but I do not think the works could be carried out for that amount. That estimate contemplates pipes of a much less size—the work being pumping work, and the water being forced there—than in this case, where it is necessary to use mains of a larger size. In a gravitation scheme, it is necessary to make the mains much larger than it is in the case of pumping. The reservoir proposed is not large enough to give compensation and water supply to Doncaster. The conduits are too small for the purpose of collecting the rain water of that district. With proper works, 10½ inches of rainfall may be collected from that area.

TUESDAY, APRIL 16.

Mr. *Baldwin Latham* recalled, and examined by Mr. WADDY.

Filtration is provided for in Mr. Rawlinson's scheme, but not in the present bill, and I have not included it in my estimate; £2500 would be required for filtration. In my opinion filtration is absolutely necessary.

Cross-examined by Sir M. WELLS: Mr. Rawlinson's estimate was £42,000, including filtration. In this case it would be necessary to make the filters near the storeage reservoir, because the fall from that reservoir is so extremely small that the velocity would also be small, and it would be very liable to deposit in the pipes unless there was filtration.

Mr. *William Moore*, examined by Mr. WADDY.

I am employed by the Great Northern Railway. I have been in their service ever since the plant was started 17 or 18 years ago. I have lived in Doncaster 22 or 23 years. I am general secretary to the Great Northern Railway Locomotive Sick Society, and have held that office for nearly eight years. Mr. Howes was a branch secretary seven years ago, when he ceased to hold that office. I know Mr. Bull, a workman on the Great Northern line. I never heard of any workman being obliged to throw up his situation and leave the town in consequence of the bad supply of water.

Mr. *Francis Carbot Fairbank*, examined by Mr. WADDY.

I am a member of the College of Surgeons, and have practised in Doncaster for more than 23 years. I am the medical officer of health to the borough, and have been for 23 years one of the surgeons to the Doncaster Dispensary and Infirmary, and a poor-law surgeon more than 20 years. As poor-law surgeon I have had half the town under my distinct charge, and have had ample means of becoming acquainted with the state of the health of Doncaster, especially as to epidemics. The water supply at present is, as to quantity, practically unlimited, both hard and soft. I never knew more than one public well dry. I never knew a deficiency in the river water. I have known a deficiency in water power, but not in the quantity of water for the supply of the town. About a dozen years ago there was a deficiency of power once or twice, and in consequence of that a steam-engine was put up. I know of two instances in which private wells have been fouled by sewage and one instance where a public well was so contaminated. The latter instance was about two months ago since this bill was lodged. In 1866 we had an outbreak of cholera, confined to two localities of the town. The outbreak was distinctly traceable to the private wells. There never has been any other attack of cholera in the town. We have had no epidemics except scarlet fever and small-pox. The scarlet fever attack commenced in September of last year. We know exactly the origin of it. It commenced by a stranger coming to the town, and from her family it spread to the neighbourhood. Ultimately more than 30 persons died of it. I investigated the circumstances connected with the history of that outbreak, and I do not think that it had anything at all to do with the water. The attack of small-pox commenced on the 1st of November last year, and in that and the following months there were nine deaths. All the neighbouring towns suffered from it. We know the exact origin of every case. The first case came from Wakefield. I ascertained the history of the various cases most minutely. They were not in any way connected with the water. It is my duty to take charge of the water supply, and from time to time I have tested the various wells. I conducted the testing of which Mr. Shirley spoke. The public well that was contaminated two or three months ago was an old one that had probably been in a garden or field. The land became building land, and it is now in a street. There was some complaint made to me, and I went up and examined the water, and found it slightly impregnated with impurities. The sucker was taken away, and I believe the well has never been used since. No mischief resulted from it. The corporation directed me to examine specially with regard to the outbreak of cholera. I did so, getting the assistance of the three physicians in the town, and they came to a resolution which stated that we had examined the place where there was a large collection of bones, and had unanimously come to the conclusion that they had

nothing to do with the cholera. Our attention was, therefore, turned to other matters. The well is in the red sand. Whenever a well has been opened in the town, I have had an opportunity of examining it, and have availed myself of that opportunity. I have found in all cases, without exception, that the sand is pure, unpolluted by sewage or anything else—pure virgin sand. It is a fiction to say that the soil of Doncaster is polluted with sewage. There used to be a good many cesspools in Doncaster, but as a matter of fact I am not aware that there is a single one left, except at Mr. Baxter's house, and that arises from his not connecting his drainage with the public drainage of the town.

Cross-examined by Sir M. WELLS: I have been aware, ever since I came to the town, that the water of the river Don was not in such a state as we should like to have it. I formerly held a very strong opinion as to the impurity of that water, but I am free to confess that I have altered my sentiments with regard to the quality of the water. I most decidedly have changed my opinion since the year 1866. The death-rate of the district is set down at 22. The Doncaster water is drunk in other parts of the union besides Doncaster. Several of the places are, however, not supplied with Doncaster water. The death-rate of 22 includes some small places not supplied with Doncaster water.

Re-examined by Mr. WADDY: I consider 22 is a fair death-rate on an average of four years for Doncaster. The grounds on which I have changed my opinion since 1866 are these. In the first place, I heard Dr. Letheby's evidence in 1866, which staggered me very much, and I inquired of analysts and I have seen analyses of the water taken lately by independent persons, and I have come to the conclusion that my opinion formed then of the existence of sewage in the river at Doncaster was not correct. The evidence given by Dr. Letheby was that sewage could not exist for 18 miles in a flowing stream. There is not a water-closet in the whole place, neither is there any water supply. The person who complained to me about the public well in Doncaster, two or three months ago, was the very person to ask me to sink another instead. The new one is not contaminated, but contains good water.

Mr. *John Lister*, examined by Mr. WADDY.

I have been coroner for Doncaster for upwards of 20 years. It has been part of my duty to make myself acquainted with the general health of Doncaster. I have been surgeon to the infirmary for upwards of 30 years, and for a similar time to the Deaf and Dumb Institution. I was a poor-law surgeon for 11 years, and I have been surgeon to the militia. I agree with the previous witness that, except attacks of scarlet fever, small-pox, and cholera, there have been no epidemics. During the whole time that I have been practising as a surgeon for the town I have never seen anything to lead me to believe that the health of the inhabitants was badly affected by the water. I have never been able to trace any disease to the water. I have never found that the water from the river has exercised any deleterious influence upon the general health of the people. In 1849 there were 56 deaths from cholera. The stream of the river was quite stagnant at that time. The Great Northern Railway Company were erecting works in such a manner that a portion of the river was perfectly stagnant, and in the lower part of the town, which was also badly ventilated, the people would insist upon drinking the stagnant water, though they could have had better water by going to the adjoining street. That circumstance affected the mortality at that time in the district. Of course the presence of the militia and inmates of the workhouse and hospital, and the attendance at the races, exercise an unfair influence on the death-rate. There were 24 deaths in the workhouse, last year, of persons who were not inhabitants of Doncaster, but who had been removed from the adjacent districts. The number of coroner's inquests for 1869, on people who did not belong to Doncaster, was 28. Of course the accidents at the races tend to increase the death-rate. Subtracting the 24 deaths for the workhouse, I make the death-rate per 1000, 24·31, without subtracting inquests. I consider Doncaster a healthy place. It is remarkable for its longevity. I use one of the public pumps, and have done so for 30 years, and I never knew anything wrong with it, nor have I heard any complaints of it. That is the Hallgate pump. I never observed that the inhabitants of Doncaster were of a "bloodless" character.

Cross-examined by Mr. DENISON: The health of Doncaster has not improved of late years. It is stationary as near as possible. I judge from the general condition of the people, and from my own large practice. I do not remember what the death-rate proved to be in 1849. It may have been 27½. As, therefore, the healthiness of the place has been stationary, 27 must be an approximation to the present rate. There are not many towns now without workhouses and infirmaries. I entirely repudiate the idea of the mass of the people of Doncaster being "pale and bloodless," though Dr. Scholfield stated, in 1849, that they were so. I did, in 1849, state that the supply of water was much worse than before the alteration in the river, caused by the railway company. I think that the wells are less dangerous than the river water. The river water is not good at times, but I never saw such specimens of it as those which have been shown before the committee. They must be exaggerated. The sooner the defect is remedied the better. It can only be remedied by the corporation taking the matter in hand and giving better water. I think they ought to have done so long ago.

This was all the evidence on behalf of the corporation.

Mr. MILLWARD proceeded to call witnesses on behalf of Mr. Boswell.

Thomas B. Boswell, Esq., examined by Mr. MILLWARD.

I am tenant for life of the Ravensfield estate, which comprises between 1400 and 1500 acres. The entail is upon my eldest son. The whole estate lies within a ring fence, so that it is a complete parcel of land by itself. I believe it occupies practically the whole of the parish of Ravensfield—all, with the exception of 33 acres, and a small portion belonging to Earl Fitzwilliam, at the extreme end of the parish. Inside the park fence is 166 acres. The park and the mansion house are tolerably near the centre of the estate. It is a very old park. The trees will tell their own story. The estate came into the possession of the Boswell family in 1762 by purchase. It is acknowledged to be a most lovely spot. There are a great number of magnificent trees not surpassed in all that line of neighbourhood. I can produce the finest Spanish chestnuts, the finest horse-chestnuts, and the finest oak; and there are, besides, magnificent beeches and elms. One beech I have never seen surpassed. On the site of the proposed reservoir there are noble trees not to be surpassed within hunting distance. There are some yew trees, whose ages must be counted by centuries, which will be doomed if the present bill passes, as well as a large quantity of younger timber. The reservoir will occupy the gorge, which has hitherto been used as fish-ponds. There is a series of fish-ponds of artificial construction. That part of the park with the cascades and the ponds is the gem of the whole estate. For 25 years before 1868 I lived continually there. I have no objection to the promoters taking a portion of my property, if they will do no harm to the estate, and if it is required for the benefit of the town. I believe the same object can be attained without making such an awful inroad upon the property. I have occasionally had to repair the banks of the fish-ponds, but I never heard of clay in the park. I should be surprised if they found clay there, and I should also be surprised if they did not find it in the Silverwood stream. There are about 90 head of deer in the park, and of course the promoters would have to put up a fence or a wall round the reservoir to keep the deer out. Such a fence or wall would spoil the beauty of the place.

Cross-examined by Sir M. WELLS: The pipes will of course not permanently interfere with the surface of the park. The house and land is all let in one piece at £380 a year. Of course the shrubberies and woodland do not produce one single sixpence to the tenant. It is not true that the land is taken at 30s. an acre. I cannot exactly say how much profitable agricultural land there is. There would probably be about 120 acres. There are magnificent trees in the low ground where the fish-ponds are, but they will have to be cut down before the reservoir is made. The reservoir will be an enlargement of the fish-ponds; but such an enlargement as to engulph and destroy magnificent trees.

Re-examined by Mr. MILLWARD: A man must be a gross ignoramus in landscape gardening to talk of beautifying a place by placing the reservoir there. The petition is entirely on my own account, and I have not communicated with counsel in any way about it.

Captain *White Hoole*, examined by Mr. MILLWARD.

I am a captain in the 5th West York Militia. I am not connected with Sheffield. I occupy Ravensfield Park on lease from Mr. Boswell. I am a petitioner against the bill. My lease has some ten years still to run. If the proposed embankment and reservoir are erected the beauty of the place will be completely destroyed.

Cross-examined by Mr. DENISON: My father is a manufacturer of stoves and grates at Sheffield. I do not say that I should give up the house if the reservoir was placed there, because houses are very difficult to get in that neighbourhood.

WEDNESDAY, APRIL 17.

Baldwin Latham, Esq., examined by Mr. MILLWARD.

I have for many years devoted attention to water-works. I have been lecturer at the School of Military Engineering, Chatham, for the last six or seven years, since Mr. Rawlinson resigned. I was called in by Mr. Boswell with regard to this opposition. That was some weeks before I was in any way concerned for the corporation. So far as I know, Mr. Boswell's opposition was entirely independent of that of the corporation. The substantial ground of his opposition is that the proposed scheme will be a serious injury to his estate, in consequence of the construction of the reservoir in the centre of the old deer park. Mr. Boswell has told me that he will offer every facility to the utilization of water for the benefit of Doncaster, provided his estate is not interfered with and grievously injured. His estate is an extremely pretty one, and there is a very large amount of timber in the valleys proposed to be occupied by the reservoir. The whole of that timber is within view of the house, but it will be destroyed by the reservoir. The embankment will not be in sight of the house, but persons approaching the house will see the mud banks. A very large number of trees will be affected by the reservoir. The embankment (62 feet high) will entirely destroy the beautiful rides and drives through the dell, and consequently greatly injure the property as a residential estate. The bank, of course, must be the property of the company; and I do not suppose Mr. Boswell would be allowed to plant the bank, because it is totally opposed to the opinions of all engineers. He could plant trees on the lower side of the bank, which is the side not approached in the drives from the house; but he could not do anything in regard to the upper side. If trees were planted on the bank itself the roots would work through, and in course of time would lead to leakage. It never is allowed in practice. The depth of water would vary vertically 30 feet, and there would be about eleven acres of bank exposed within the park at low water. Those banks would be of the nature of mud banks. All vegetation would be destroyed from the area having been submerged. I do not in this case agree with Mr. Hawksley's theory that the waves of the water would purify the bank. In my judgment the banks would be a great detriment and injury to the estate. Regarding it as a residential estate, I should consider the property almost ruined. At the upper end of the reservoir there is a stone quarry, which will be swamped. The estate is on the coal measures overlaid by sandstone rock. No doubt the abstraction of the water from the estate and placing it in the reservoir would seriously affect the future working of the minerals. The severance of the estate caused by the reservoir would be a serious injury. The class of people that would be forced into the park by the works would certainly not be desirable visitors; and for all time to come afterwards there must be a certain amount of traffic to and fro to the reservoir, and the workmen would have to enter the park at various times. Practically, all the water taken from the streams would be taken from the river Don, and by so much the purification of that river would be deteriorated. My opinion is that compensation ought to be provided, and can be provided, if the reservoir is sufficiently capacious, and if the works are properly designed, with the view to convey the maximum rainfall into the reservoir. I see no reason in this case to depart from the ordinary practice of Parliament to require water compensation. Below the site of the reservoir, and below the park, the stream bounds Mr. Boswell's estate for a considerable distance, and that stream, which is now at all times of the year well supplied with water, will be deprived of nearly, if not all, its water in the summer time, as the works of the springs supplying that stream are above the site of the proposed bank. The scheme is to collect the water from the Silverwood Valley, and bring it in an 18-inch pipe. As I understand the bill, there is nothing in it to require that to be a covered pipe. It may be made an open conduit, and they may take what width they please. They might sever the whole estate in its construction.

Sir M. WELLS: There is no intention to put anything but a pipe. We are quite willing to bind ourselves to lay pipes down.

Mr. MILLWARD: My friend will not prevent my showing how carelessly this thing was got up. The bill says, "A conduit or a line of pipes."

Witness: The conduit may be an open gutter. The object of storeage reservoirs is to collect the flood waters, in order that the maximum flow may be stored for use for another time; and if the works are not capable of conveying the maximum floods into the storeage reservoirs, they are insufficient.

The CHAIRMAN: If a conduit was placed instead of a line of pipes, I suppose that might be of any size, and so the estimates might be affected?

Witness: Yes.

Mr. MILLWARD: Their estimates bind them down to pipes of 18 inches, and I cross-examined Mr. Hawksley to show that that would be utterly insufficient.

Examination continued: The drainage area of the district between Den Brook, Clifton Brook, and Lea Brook is 958 acres, so that the conduit or line of pipes ought to be able to carry the flood waters of that area. The 18 inches would only be capable of conveying away from the 950 acres in the 24 hours a depth of 7·100ths of an inch of rainfall, taking into calculation the rate of inclination as 1 in 1260. In order to utilize it fully, I calculate to convey a rainfall of one inch in 24 hours from the whole area we should require 24 inches to begin with, increasing to 33 inches for the second brook, and ending with 48 for the third brook. With an 18-inch pipe the waters which are wanted for the purpose of storing would decidedly run to waste; and not only so, but this 18-inch culvert running full would have such a small velocity (not more than 1·6 feet per second) that it would be very liable to silt up. Such a velocity is not sufficient to keep a pipe of that kind clear. In my judgment such a pipe is utterly insufficient to preserve or fully utilize the waters. In my own works in pipes of that size I never admit of a velocity less than 2½ feet. In dry weather they would certainly take the whole water out of these three brooks, so that all persons below the points at which the water is intercepted would be deprived of their water. In flood times, on the other hand, the water would not be fully utilized.

Sir M. WELLS: That only affects the Duke of Leeds, and we have arranged with him.

Mr. MILLWARD contended that the arrangements made with the Duke of Leeds ought to be stated to the committee, because they might seriously affect the petitioners.

The CHAIRMAN: I think any arrangement made with other landowners should be laid before the committee if it affects the supply of water.

Sir M. WELLS said he would comply with the chairman's request, and state at once that they had arranged with the Duke of Leeds that the abstraction

of water might be compensated by steam power, or, if practicable, at the option of the company, by water.

Examination continued: One of the streams intercepted runs through Mr. Boswell's estate. The Silverwood stream would be robbed of water for a distance of over a mile. The same objection applies to the size of the pipe or conduit bringing water from the Silverwood stream; that is a less inclination than the other one, and the velocity will be 1·65. It is rather a shorter length; the 18-inch pipe would not be of sufficient capacity to carry the flood waters. Such a pipe could carry 10-35ths of an inch of rainfall from 280 acres. There are at present roads in the neighbourhood of the site outside the park, but none inside, except the private roads.

The CHAIRMAN: How will that 10-35ths power do when compared with the 7-100ths which the other pipe would carry? Would it be about 3-10ths?

Witness: It is in the proportion roughly of 1-14th to 1-3rd. If it came to be 2 inches in 24 hours the works would be entirely insufficient. I have allowed in my calculations for 8-10ths of an inch to flow off in 24 hours. There are at present no roads available for the formation of the embankment. After the works are completed they will require to make roads to it, and some part of these roads must go through Ravensfield Park. The formation of the land is such that they could not follow on their own banks. It would be necessary that there should be access to the bank for all time. Great quantities of the water which falls must run to waste in consequence of the inability of arriving at the storeage point. The proposed works are, in my judgment, not sufficient to provide both for the supply of Doncaster and for compensation water, because so much must be wasted in wet seasons. The reservoir is not sufficient for containing the compensation and the water supply; the running to waste would be entirely due to the insufficient extent of their storeage. As soon as the reservoir is full the rest must run to waste, and be useless to everybody. If compensation water was given the waste water would be available for that purpose. I consider, having regard to the population of Doncaster and the increase during the last decade, 14 and a little more per cent., that in 30 years time the population would be about 30,000, and that 30,000 people should be provided with water, which, at 25 gallons per head, would be 750,000 gallons per day. The country would supply compensation water at the rate of 620,000 gallons per day, and water supply at the rate of 1,240,000 gallons. The proposed works will not give that, but the country would give it if the works were sufficient. The reservoir is not sufficiently capacious for storing for a dry season for both compensation and supply. I have estimated the drainage area at a less acreage than they have—2850 acres, and that 10½ inches rainfall can be collected from it. I do not allow for the waste which they say they must allow for, because their works are insufficient. I know works which collect a far larger proportion than I propose here. The reservoir should be very much more capacious than they intend. This reservoir, allowing for compensation and the water supply at the rate of 750,000 gallons per day, would only hold 133 days supply, about two-thirds of which would be due to the Hooten Brook. I consider the site which they have chosen for their dam and reservoir not a good one. Within sight of the reservoir there is no clay, though there is in the valley. It is absolutely necessary, for making a dam of this description, to have clay. Above the reservoir the whole of the district is clay. It is out of the limits of deviation. There is also clay within their limits of deviation, in the Silverwood Valley, but that would have to be carted a considerable distance. There is no clay sufficient for works of this character to be found on the site of the reservoir. Both above and below the site the rocks are very much fissured, and there is a fault in the valley below which has considerably disturbed the strata, and the fissures are the evidence of the disruption. The fault is decidedly not a desirable thing, and it is one which an engineer would not approach without a considerable degree of hesitation. When I examined the water flowing down the Hooten Brook in February it was extremely turbid. The district is highly cultivated, and the surface is clay. The consequence is, the washings from this clay surface must flow into the water to a great extent. There is no site immediately below the embankment where they could put filter-beds, except the one which is so low that they would have to pump the water up. That would be practically going to Mr. Rawlinson's plan. To place filter-beds on the level land below would cost £2400, but that would sacrifice the gravitation scheme, and the fall of water into Doncaster. My estimate of the works, as proposed by the promoters, amounts to £110,000.

Cross-examined by Sir M. WELLS: No doubt Mr. Hawksley has had considerable experience with regard to the construction of water-works. When Mr. Hawksley said a scheme for supplying Doncaster with water would be complete without filtration, I do not think he could have seen the water in the state in which I saw it. Mr. Hawksley did not state that an 18-inch pipe would be sufficient. He says it is wholly unnecessary to make pipes four or five feet in diameter, because it can be made of other materials, and I agree with him in that. If the rain fell every day, the 7-100ths of an inch per day which I calculated for the 950 acres would equal 25 inches in a year; but it only falls 157 days. It is only proposed to take 6¼ inches by the present bill; but I say you can take 10½ inches. The works, however, will not take that quantity, because as the floods come down they cannot catch them. If the works collect 6¼ inches as contemplated, there will be sufficient for a supply of water, but not for compensation. They are of a simple character. There are no engineering difficulties. The difference between Mr. Hawksley and myself is this: He says 6¼ inches are taken for the water supply, and I say 7 are taken for the water supply; but I also provide for 3½ inches for compensation. I do not consider the works sufficient for the supply of water and compensation as well. They may be sufficient for water supply alone, subject, of course, to the conduits being larger. The area of grass land drained is much larger than that of arable land. Perhaps two-thirds is grass land and wood land, and one-third is in a high state of cultivation. The deposited plans do not show a line of pipe in section; and, according to the plans, the line may be carried out either as a drain or as a line of pipes. It would meet one of the objections if the promoters of the bill would consent to its being a line of pipes. That is one of the objections which certainly ought to be insisted upon. The village of Ravensfield is to the south of Ravensfield Park, about 25 chains from the proposed site. If it were only necessary to allow foot passengers to go to the dam they could go down by the roads by a circuitous route, but it is necessary to have a cart road. Such a road would not be very much used after the construction of the reservoir. Still it would be necessary. So far as daily examination of the works is concerned, there would be only one or two men go; but I am speaking now of what would be required in case of repairs being necessary. The quarry which will be submerged is a sandstone quarry, not worked at the present time, but very good stone is procurable there. If it were destroyed, there would, of course, be no interference with an existing work. I consider that a navigable river like the Don ought not to be satisfied with anything but a water compensation.

Re-examined by Mr. MILLWARD: So far as the construction of the works is concerned my figures tally with Mr. Brondell's, but he has not given any estimate as to compensation. He has, however, seen my estimate under that head, and if my estimate for compensation were added to his estimate for works, our totals would be very nearly alike. That would bring his figures up to £113,447.

The CHAIRMAN: Would it be possible to collect so large a proportion as 8-10ths of an inch, in whatever time?

Witness: Certainly; and much more than that. My experience in works of sewage over the country shows me that much larger quantities than that often pass the sewers. The available per centage of the small rainfalls is very much less than of the large rainfalls. If you want to secure the water you must make provision for collecting it when it is most abundant. When Dr. Letheby said that the water did not require filtration, it was evident that he was never at the spot, and only judged from one sample. The water may be good at one time, and bad at another. Certainly in this case filtration is very desirable, and ought to be carried out.

Mr. *Brondell*, examined by Mr. MILLWARD.

I have examined the site of the proposed reservoir, and I do not think it the best that could have been selected. My estimates tally very nearly with Mr. Latham's. The £60,000 estimated by the promoters is not at all adequate. If I had had to choose a site for the works I should certainly not have gone into Mr. Boswell's park if I could have gone into any other place. I have examined the Silverwood Valley, and I say that is the place for the works, on the estimation that the water is to be taken from this district.

Cross-examined by Mr. DENISON: I did not help Mr. Rawlinson when he was at Doncaster some years ago. I have not made any reservoirs myself, but I have made embankments for impounding water. I have not made embankments for such a purpose as this. I have made them for flood banks, but never for damming up a great quantity of water. The deepest bank I ever made was 20 feet. That was in the river Witham, on the Great Northern Railway.

This concluded the evidence on the part of Mr. Boswell's petition.

Mr. MILLWARD, in addressing the committee, said that it was in no spirit of opposition to the town of Doncaster, or from any desire in any sense to act the part of the dog in the manger, that Mr. Boswell opposed the present scheme. He opposed it on the ground that it was an unnecessary invasion of that which, in the eyes of Parliament, always appeared to be as far as possible sacred—the privacy, and comforts, and enjoyments of a gentleman's residence. This invasion was unnecessary, because the objects of the promoters could be fully attained without it. If Doncaster was in an extreme state of instant and urgent need of water, he (Mr. Millward) could well understand the great anxiety on the part of the committee to pass any scheme which should tend to remove that instant and urgent need, although the scheme might not be entirely satisfactory, and although it might invade the private rights or interests of any individual owner or occupier. But here was a proposition to appropriate a considerable portion of a gentleman's park, which had always been occupied as a park, which was essential to the enjoyment of his mansion residence, and to appropriate it for the supply of a town which, upon the balance of testimony, certainly wanted a better supply, but which was by no means in a state of extreme anxiety or urgency for such an improvement. The park was a spot of unquestioned beauty, which even Mr. Baxter—who, of course, would be desirous of saying all he could to mitigate the injury which was to be done—was bound to admit. By the proposed bill its features would be entirely changed, its enjoyment entirely ruined, the great objects of its owner's delight destroyed, in order that the town of Doncaster might have afforded to it a supply of water a very short period of time before the town would supply itself. The committee were now asked to sacrifice Mr. Boswell's park for the purpose of giving a most uncertain benefit to the town of Doncaster, though it had not been made out that the benefit could not be given without causing that sacrifice. The scheme had been carelessly got up, without regard to the injury it would inflict, and was one which ought not to be sanctioned by the committee.

Mr. BIDDER, on behalf of Lord Fitzwilliam, said that he had no desire whatever to offer any unreasonable opposition to a scheme for supplying the town of Doncaster with water. But the promoters ought to take care not to do unnecessary damage to the millowners. The present scheme, however, would do unnecessary damage to Lord Fitzwilliam's property, and he therefore opposed it. He had no desire for money compensation. He simply wanted to be left alone. If there was any class of people entitled to favourable consideration on the part of the committee it was those whose property was proposed to be taken compulsorily by a company such as the present. The principal portion of the learned gentleman's speech was occupied in a comparison of the evidence given by Mr. Hawksley in favour of Lord Fitzwilliam, in 1864, as to the merits and value of the Hooten Brook, and the evidence which had been given before the present committee. In conclusion the learned gentleman urged the committee not to deprive his client of the water supply simply because the promoters had chosen to design insufficient works.

THURSDAY, APRIL 18.

Mr. DENISON, in reply, said Mr. Baxter understood that it was absolutely agreed between him and Mr. Newnham that a certain clause which had been drawn out embodied all Lord Fitzwilliam's requirements, and that nothing more was to be heard of his opposition. Mr. Newnham was, however, subsequently urged to be more unreasonable in his demands, and the settlement fell through. Turning to Mr. Boswell's case, the learned counsel said it was one of the most curious features of this most curious case that Mr. Boswell, of all others, was the gentleman who took such a deep interest in the estimates. He could have understood the town of Doncaster taking such an interest, but throughout the whole of Mr. Rodwell's speech there was not one single word on the subject of the estimates. That subject was left to Mr. Boswell, to whom it could not signify one brass farthing whether the estimates were sufficient or not. Mr. Millward had rather taunted him with not cross-examining Mr. Latham about the estimates, but the answer was, "Why did not the town of Doncaster go into it?" When he found that the town of Doncaster did not, he had a right to consider that it would not be gone into minutely at all. Whatever the evidence with regard to the estimates was, however, it did not concern Mr. Boswell. With regard to the injury to Mr. Boswell's estate, the committee had heard the rent that was paid and the length of the lease. It was extremely improbable that Mr. Boswell would resume his residence at Ravensfield Park, which must, therefore, be simply regarded as a place producing £380 a year. The practical question, then, was whether, for the pleasure of saying that he had a place containing this fish-pond, Mr. Boswell was to stand in the way of the town of Doncaster having the water it required. It appeared to be simply a question of lake *versus* fish-pond, and it might be that Mr. Boswell's son, when he came into possession of the estate, would prefer the lake. If at any time Mr. Boswell wished to sell the park, then the lake of 36 acres would figure in the advertisements, with all the right of fishing, boating, and drinking. The committee should, therefore, require to be very fully satisfied the interests of the town. It was perfectly clear, from Mr. Rodwell's cross-examination of the promoters witnesses, that he was quite ready, if the corporation would allow him, to give a most solemn pledge that they would undertake to give a good supply of water to the town. He did say that they would undertake to improve the water, but he added, "whenever occasion arises." This was the way they took the pledge at Doncaster. If there were a place in the world where the people would be slow to take the pledge, he should think it would be at Doncaster, knowing what it involved. But this was the "solemn" pledge which the Corporation of Doncaster allowed Mr. Rodwell to give. Mr. Rodwell said, Dr. Letheby did not condemn the water. Did he not? Did he not say that the pumps ought to be shut up; that although he could not undertake to say they were unsafe, yet some of them were, and ought to be prohibited. He added that the soil under the town of Doncaster must be pretty well saturated with sewage matter. This was the opinion expressed by the most liberal chemist of the day, who almost alone held the opinion that, after flowing a certain distance

in a river, sewage became purified. Even he objected to the water from the pumps, because the soil of Doncaster was saturated with sewage matter. It was perfectly evident that the whole scope of Dr. Letheby's evidence was that the wells ought to be stopped, and to be marked dangerous; for, although the water might be pure at present, it certainly was not always so. This was proved by the corporation stopping at different times three or four of the wells because they were so very bad. It was scarcely worth while to deal with the continued charges of exaggeration as to the bad state of the supply. Bottles could not exaggerate; taps did not exaggerate. It was not pretended that the water was always as bad as the worst bottles, and Dr. Letheby had not picked out the worst. Where, however, were the samples of good water, either from the Don or from the wells, which the corporation might have produced if the water was as good as they represented? If there had been exaggeration, the right thing for them to have done would be to have called some independent medical man to say that, generally speaking, the water was pretty good. Mr. Rodwell would have it that this scheme was got up to sell, although the committee had been distinctly told that it was not. Mr. Baxter and Mr. Bartholomew had said that they were ready and willing to carry it out themselves. With regard to the purchase of the existing water-works, no doubt there was a wide difference in the estimates; but the committee should remember the significant answer given by Mr. Hawksley: "Water-works they have none to sell, because water-works for any purpose such as that of this Act are works capable of supplying what the Act of Parliament calls good and wholesome water." In that sense, therefore, the corporation had no water-works to sell, though they had mains and a steam-engine to dispose of. Whatever these were worth the promoters would give for them, if they considered it worth their while to do so rather than to lay down new. One way of estimating the value of water-works when they were efficient was by a certain number of years purchase of the profit of those works, in which case the working stock was not taken into account. The corporation, therefore, might have the option of selling the stock at whatever it might be valued at, or at a certain number of years purchase of their profits. What those profits were the promoters did not know, for they were so involved in other accounts that no human being outside the Water Committee knew anything about them; but this at least was known, that they boasted of supplying the town for merely the working expenses, and they took credit to themselves for making no profit. Then how could they say that they valued the works as a profitable concern at £25,000? This estimate, coming from the corporation to the promoters, who were attempting to do that which the corporation had neglected, could be described as nothing less than impudence. No doubt it would be far better if they themselves were the suppliers, but the promoters could not compel them to be so. However, if they wished, they might have a clause inserted in the bill for buying the works at any time. Still, what Mr. Hawksley said should not be forgotten, that it is a fact that companies work cheaper than corporations. The explanation was easy. Companies were not in the habit of keeping amateur engineers. They knew it was better to go to engineers of eminence. In corporations, however, there was generally some influential man, whose speeches were reported in the papers, who liked to pass as an amateur engineer, and it was not difficult to guess who was that man in the present case. Companies, moreover, felt that every penny they spent came out of their own pockets, while the members of a corporation, being only a few out of many thousands, the rates affected them less than their vanity and their conceit. How had Parliament dealt with the Thames companies? In 1852 the companies were found to be supplying water from places too low down the river, and they were driven further up, involving them in great expense; and again, last year, Parliament took them in hand, and made them do other things, although there was no pretence that the water was not pure, for the Duke of Richmond's commission reported that the Thames water was pure and would be purer still when the towns of Reading and Oxford had completed the works which they were engaged in. The London companies were not allowed to insist on their vested rights. If the Doncaster Corporation had come against a company and said what had been proved by the promoters of this bill against the corporation, though it might have been pleaded that the scheme would involve the company in a great expense, the answer would have been, "Good water is of far more consequence than a little expense more or less," and the company's vested rights would not have weighed one feather in the scale. Mr. Bidder had suggested that the committee might put a little judicious pressure on the corporation. How could that be done? Could it be supposed that the corporation cared twopence for what the committee might say? They cared a great deal about what the committee did, because they could not interfere with that; but they would not be driven into adopting a new scheme by any resolutions which the committee might come to. The only effective pressure that could be put was the passing of the present bill. Some years ago a number of people living in the outskirts of London complained that the New River Company did not give them sufficient water, and the New River Company came before Parliament and pledged themselves to give more. There was not the least doubt on the minds of the committee that they would keep their promise. The bill which the inhabitants had brought forward was, however, passed, and nothing more was ever heard of it, because before it was taken to the House of Lords what was objected to was carried out, and the whole matter was settled. So in the present case, the committee had no means of enforcing any pledge by the corporation, except the passing of the bill. Even if the committee had a suspicion that somewhere in the neighbourhood of Doncaster a better supply might be obtained, yet there could be no security that the corporation would take any steps in the matter, unless the security of passing this bill were given. That might be attended with this condition, that if the corporation, next session, satisfied Parliament that they had a better scheme, then the present scheme should die, they, of course, indemnifying the promoters of this bill for the costs. That was the only way to prevent the corporation from slipping away from their pledges, and they would have from now to November to invent the very best scheme they could. All they would have to do next session would be to satisfy a committee that they had produced an efficient scheme for the supply of the town, and then all the powers of the present bill would cease, and the promoters would derive no benefit. All they wanted was the barest indemnification against costs.

The room was then cleared, and after a consultation of considerable length the public were readmitted, and

The CHAIRMAN said: The committee, after very careful consideration of the evidence that has been laid before them, and the observations that have been made thereon, have come to the conclusion that the preamble of the bill is not proved; but in making this announcement it is the wish of the committee that I should state their opinion that the Corporation of Doncaster have been somewhat negligent and dilatory in giving a supply of water to the town, and that it is their opinion that steps ought to be taken by the corporation as soon as possible for giving a proper supply of water to the town. They have empowered me especially to call attention to the 49th section of the 29 & 30 Vict., c. 90, by which it is possible for any one to make a complaint to the Secretary of State with regard to the condition of the water, and I may say that it is a matter of great doubt whether it would not be my duty, as the chairman of this committee, considering the evidence that has been laid before us, to have made that complaint. This section permits any person—therefore it is open to anybody in the town of Doncaster, or any person interested in the matter, and, perhaps, it would come better from them than from me—to make such complaints, supposing the Town Council do not take action in the matter, and to call in the Secretary of State to put pressure on the Council. That is open to any one to do, and it can be done at any time; and it is the opinion of the committee that if the council do not rapidly take some measure to promote a good scheme for the supply of water to the town some person ought to take that step.

Mr. MILLWARD asked for costs on behalf of Mr. Boswell.

Sir M. WELLS objected that costs could only be given when the committee were unanimously of opinion that there had been unreasonable and vexatious conduct on the part of the promoters.

The CHAIRMAN ruled that no costs could be given.

Mr. RODWELL: I am desired to say, on behalf of the corporation, that they will take the matter into their serious consideration, and, if necessary, they will come to Parliament next session with a scheme for a good and abundant supply of water to Doncaster.

Sir M. WELLS: After listening with very great attention to your observations, I have humbly to ask that you will make a representation to the Secretary of State in reference to the existing supply of water to Doncaster. After what has been said by your lordship of the evidence given before this committee as to the dangerous state of the present supply, I think a representation from this committee would carry great force, and I humbly pray that you would consider if such a step could be taken.

The CHAIRMAN: We did take that matter into consideration, and we came to the conclusion that as a committee it was *ultra vires* for us to make such a special representation as you suggest; but as a private member of Parliament, after having heard this evidence, I am quite willing to say that I will give full consideration to the application.

(*Before Mr.* WEGUELIN, *Chairman; Mr.* DIMSDALE, *Mr.* SALT, *and Mr.* BROWN. *Referee, Mr.* BONHAM-CARTER.)

BOLTON CORPORATION BILL.

THURSDAY, APRIL 18.

Mr. POPE, Q.C., Mr. EDWARDS, and Mr. EDGE appeared for the promoters; Mr. CLERK, Q.C., Mr. RICHARDS, Q.C., and Mr. POOLEY for the Bolton Gas Company; and on behalf of the other opponents of the bill the following counsel appeared:—For Mr. Ainsworth, Mr. LITTLER and Mr. STEPHENS; for Mrs. Rostron, Sir MORDAUNT WELLS and Mr. LASCELLES; for Sir C. H. Tempest, Mr. MUNDELL, Q.C.; for the ratepayers of Great Lever, Astley Bridge Local Board, and Halliwell Local Board, Mr. HOLKER, Q.C., and Mr. LITTLER.

Originally there were 18 petitions lodged against the bill; but when the bill was called on, there were only five petitions to deal with, as represented by the counsel named.

The object of the bill is to empower the mayor, aldermen, and burgesses of the borough of Bolton to make street improvements and additional water-works, to transfer to them the gas-works, and to amend the Acts relating to the borough and other purposes.

Mr. POPE stated the case for the promoters. He said, as was usual in these improvement bills, the objects were various. The first matter alluded to in the preamble was the extension of the boundaries of the borough, and its re-distribution into wards. That matter was opposed. Then came the acquisition of lands for improving streets and for other purposes, which was unopposed. The water-works were next dealt with, and then came the clauses for the purchase of the gas-works. The heads of the agreement between the corporation and the gas company, constituting the bargain made between the parties, were printed in the fifth schedule to the bill. The questions to be discussed as opposed matters were the extension of the boundaries of the borough, certain portions of the water-works provisions, and the opposition from some outside the borough to the acquisition of the gas-works by the corporation. After referring to the proposed extension of limits, the learned counsel proceeded to state the case relative to the water-works extension. He said: "By the Bolton Improvement Act of 1847, the corporation were authorized to purchase the Bolton Water-Works Company's undertaking. The provisions of that Act were extended in 1850, and completed by the Bolton Improvement Act of 1854. By that Act the corporation became entitled to take the Bolton Water-Works, and they were able, by the means of those works, to supply about 2½ millions of gallons per day. But the Act to which your attention will be mainly directed is the Improvement Act of 1864, which was promoted by the corporation, because they found their supply of water becoming insufficient. By that Act they were enabled to purchase a reservoir called Turton and Entwistle. In order, however, to carry out that scheme, Turton and Entwistle reservoir having been a millowner's reservoir, the corporation were bound to construct, for the purpose of the millowner's compensation, another reservoir called Wayoh, and to construct an aqueduct to convey the water from the Turton reservoir into the supply reservoir, and other works; but before they could supply water from the Turton reservoir to the inhabitants of Bolton they were bound to complete these works—it was the condition of their obtaining that supply. One of the questions which would have to be discussed was the question arising from section 23 to the Act of 1864. He was glad to be able to tell the committee, however, that the parties had come together, and this portion of the bill had been disposed of. [The learned counsel then referred in detail to the several petitions presented against this part of the scheme, as more particularly dealt with in the evidence, and proceeded.] I now come to that which is, perhaps, provocative of the most discussion, although I am inclined to think you will find the opposition as shadowy as any that I have already indicated to you; that is, the purchase by the corporation of the gas company's undertaking. The gas company of Bolton obtained their original Act as long ago as 1820. That was repealed or modified by a subsequent Act which is found referred to afterwards. I do not know that we need go into details, but the Act under which they at present supply their district is the Act of 1854, the limits of that Act being extended by the Act of 1864. I shall have to refer to that Act presently, because it is in the operation of the general law upon the undertaking, in connexion with their Act of Parliament, that much of the discussion we have to deal with arises. By the balance-sheet which the gas company published in December, 1870, they appear to have called up the whole of their authorized capital—namely £187,000. They had a reserve-fund of £15,453, and upon that something will turn by-and-by. It does not appear that they had exercised any of their borrowing powers. Why, I do not exactly know. That reserve-fund had been invested, as they might do under their Act of Parliament, in works and extensions, their maximum dividend being uniformly paid. By their Act of 1854, no limit was prescribed as to their reserve-fund. Therefore, as will be familiar to the honourable referee, the provisions of the general law, the Gas Act of 1849, would apply in such a case; that is, the reserve-fund would be taken to be 10 per cent. upon the amount of capital to be called up. So that as the matter stood at the time of the negotiations with the corporation, £187,000 capital, a dividend of 10 per cent. would represent a reserve-fund of £18,700; then profits in reduction and price. That would be the position of the company supposing them to be *in statu quo*. But in October last the company, finding that the consumption of gas was in excess of their means of provision, and that an extension was absolutely necessary, determined to obtain more capital for extension. The sum which they contemplated raising was a further capital of £200,000. As soon as the corporation became aware that the gas company's undertaking was likely to be increased by this new capital of £200,000, they, of course, I think you will say very prudently, felt that this was the moment that, if at all they were to become possessed of that undertaking, they should negotiate with its proprietors. I do not pause now to discuss the question of the propriety of the gas and water supply being in the hands of the municipal authorities. A long course of parliamentary decisions upon that question has put it beyond discussion; and we may take it now as

an accepted proposition on all hands that the best parties in large communities to have the control of matters of this kind are the municipal authority which governs the community. Well, as the negotiation proceeded the result was the bargain, the heads of which are contained in the schedule, which you will find at page 39 of the bill, the heads of the agreement between the corporation and the gas company. Among the petitioners, who are represented here by some of my friends, Mr. Richards represents the gas company, who are petitioners, not with the view to oppose this bill, which is to carry out the bargain made with them, but to see that the clauses which are introduced for the purpose of carrying out the heads of agreement are satisfactory, and are such as they can really and truly sanction, as being one of the parties to the bargain themselves. This is then the exact position of the matter. The corporation have agreed with the gas company, if you should think fit to sanction it, to purchase their undertaking upon certain terms. Those terms of purchase are objected to by nobody; they are sanctioned by the general voice of the community as prudent, as economical, and as desirable. The only opposition which is really brought against this scheme is the opposition which is embodied in three petitions—the petition of the Halliwell Local Board, of the Astley Bridge Local Board, and a petition of ratepayers of Great Lever (John Harwood and others), which is the last to which I shall have to refer. All these three petitions are represented by the same counsel. You will not, fortunately, have the matter discussed more than once, it will be ably discussed, I have no doubt. They are represented, all of them, by the same solicitor and by the same agent; and I doubt not that you will come to the conclusion that they are probably inspired by the same suggestion. I do not mean to say that there is anything in these petitions which the parties are not fairly entitled to argue. But it is a little curious that when I say frankly, on the part of the Corporation of Bolton, that I am instructed that should their desire be an entire disruption of the bargain, that in all probability, if the notion of these opponents were to be carried out, the gas-works would not be purchased by the corporation, and that the object of the whole matter would possibly be defeated. One, perhaps, is not saying too much in expressing a belief that possibly the very object they have in view may be, not to obtain terms, but to make the purchase impossible for the corporation. I do not say it is so. At all events, there are circumstances, from which we may draw natural and not altogether inconclusive inferences. What they say amounts to this, that while the gas-works were in the possession and control of the company the company were bound to reduce the price of gas if the reserve-fund exceeded 10 per cent. upon the capital which was raised. If the gas-works passed into the hands of the corporation, the profit being no longer under the provisions of the Act of 1847, but being taken by the corporation, as is usual in all such cases, for the purpose of borough improvement, or for any other purpose for which the corporation may choose to apply it, that we shall be in this position—that we shall be paying profits to the borough which will be applied for borough purposes; whereas if it had been under the company we should have a reduction of price in respect of profits. I do not apprehend my friend will find much fault with that statement of what he conceives to be his grievance. Let us see, first of all, what his grievance really is; then we will see if my friend has any right to complain of it. The position which they hold with respect to the gas company is this. Of course, the first thing that the gas company will do will be to pay its maximum dividend; that is, profits upon capital employed. They positively ask by their petition that the corporation should take over the entire undertaking; have all the risk, all the responsibility, and have no dividend whatever, because it cannot matter much whether it be taken in the way of dividend on the capital employed or not. The proprietors of the gas company need not have put the profits in the public streets of Bolton, but in their own pockets, and the consumers of Halliwell would have had to pay their share of those profits. But just consider what they say in their petition in paragraph 4: "That by the Act of 1854, and the Gas-Works Clauses Act, 1847, provision is made for regulating the price of gas supplied by the gas company, and for the price being reduced when the profits of the gas company exceed the prescribed amount; and by virtue of such provision a considerable reduction has been made in the price of the gas supplied by the company to your petitioners and others; and inasmuch as the reserve-fund of the gas company has nearly attained its maximum amount, a further reduction in the price of gas must shortly take place." They found their application upon the suggestion that they would very soon be entitled to a reduction in the price of gas. In the first place, the limit of the reserve-fund never has been reached, and they have never been entitled on that ground to a reduction in the price of gas. Even if matters remained *in statu quo* they would not have been entitled to a reduction in the price of gas until the reserve-fund had been increased from £15,453 to £18,700. Nay, more; when you hear that it was absolutely essential for the gas company's undertaking that they should raise a further capital of £200,000, they never could have a reduction in the price of gas until, in addition to that £18,700, they had created a further reserve-fund of £20,000. Nay, they never could have had a reduction in the price of gas until they had paid the 6½ per cent. upon the £200,000 additional capital, and raised their reserve-fund £20,000. Practically, this grievance has no existence; it is a mere visionary, shadowy thing in the clouds, which never will have any real existence in the lifetime of the petitioners. Let me point out further—and it is essential in discussing this matter you should bear that in mind—that we have secured for these gentlemen, who are not themselves burgesses of the borough, this advantage, or at least the gas company have, that, whereas now the gas company have no limit as to the price of gas to be charged beyond their limits to Astley Bridge, we have undertaken by the aid of the agreement that a difference in price between what you may call the out-district and the in-district shall never, under any circumstances, exist; so that we absolutely give to the out-districts precisely the same right of control and the same advantage of control which is given to the burgesses within the borough itself. Why is it that ordinarily speaking no such restriction is made as my friend seeks? The profit, instead of being appropriated to the general purposes of the borough, should be appropriated to the reduction in price. Why is such legislation exceptional? I do not say it does not exist. You will have a long series of Acts of Parliament put before you. Manchester, Oldham, Blackburn, Rochdale, Bury, and all the great towns in this district, where it has been found the most convenient course to apply gas profits to improvement purposes, to the purposes of the improvement of the borough, as we propose to do in this particular instance. Why is it legislation found this to be necessary? For this simple reason—the corporation are not in the position of common traders, for the sake of profits. They are subject to the control of the constituents to return them to the council, and if the inhabitants of the borough are not satisfied with the profits of gas, they will do exactly what has been done in Manchester and Salford; they made the price of gas, and will give them what they want. That is why nobody in the borough complains of this, or says one word about this difficulty, which is suggested by these out-townships. We have secured for these out-townships precisely the same advantage, because every reduction within the borough must, by the terms of the Act of Parliament and our agreement with the gas company, be followed by an equal reduction outside the borough. The moment, therefore, that we reduce the price in the in-districts, the price in the out-districts must come down to the same level. I do not stop to say anything about a difference in price between the out-districts and certain districts within the borough, because we know that considering the increased expense of distribution, it is only fair that the out-districts should pay something more than these in-districts do. That is a principle that has always been sanctioned by Parliament; it is the universal course of legislation. Therefore, while we charge these out-districts a slight increase for the increased expense of distribution, on the other hand, we give them precisely the same advantage as the burgesses within the borough. But I must own it seems to me that beyond that, the petition is certainly—somewhat monstrous I was going to say, though, perhaps, that is rather a larger word than I care to use. Because, what is it they are asking? They are asking to share the profits without being partners in the transaction. They refuse to come within this borough. We say to them, "We are willing that you should come within this borough and have the whole advantage." Oh, no; the moment we propose an extension of the borough to Astley Bridge and Halliwell, they will not come in, they will not share the risk, they will not take the responsibility; that responsibility must be taken by the burgesses of Bolton. If there be any risk, any loss, any accident, the Bolton rates must pay them. But the out-townships, who refuse to participate in the risk, claim to share in the profits. That seems to me to be very monstrous and inequitable. I always thought that a share in the profits, *quâ* profits, at all events until very recently, was supposed to mean a partnership as regards loss, but that does not seem to be the notion of the inhabitants of Astley Bridge and Halliwell. Of course, my friend will deal with that part of the case; but really, when you come to look at it—when you see that Astley Bridge and Halliwell, although their houses are not delineated on the map, are, in point of fact, neither more nor less than the suburbs of Bolton, and when we know that the profits of gas would go in the erection of a Town-hall or a Market-hall, in widening streets, in sewerage, and improving the thoroughfares, and there is not a single inhabitant of Halliwell or Astley Bridge who passes through the town of Bolton to his place of business who would not have just as much benefit in the improvements of the town as the last inhabitant would who resides within the boundary—it does seem monstrous in the present day to revive old legislation on this question, and for these gentlemen to come in and object to an equitable bargain upon such a fanciful ground as this. It would not have happened but for some provision which was introduced into the bill of 1864, which was subsequently struck out by the House of Lords, upon which they have founded their petition. It was introduced then, and it would have defeated the object then; and if introduced now, it will defeat the object now. It will be for you to say whether this advantage to the borough is to be overturned because these townships and local boards come and put forward a grievance which has no existence, and say that if this company had existed as a company they would have had a division of profits, in the sense of having a reduction in the price, when the fact is that the reduction must have been postponed certainly beyond the lifetime of any of us here—whether that is, in fact, such a practical grievance as is to stand in the way of a great public advantage. More than two-thirds of these petitioners are themselves burgesses without the borough in order to escape the municipal rates, but the great majority of whose workpeople are inhabitants within the borough, and have the same advantage of street improvements as those who live in Bolton itself. The very business of the Astley Bridge Local Board is conducted in an office within the boundary of the borough, and Halliwell also, I am told; and yet they come and say, "We have no interest in borough improvements." With reference to the reduction of price, there have been certain reductions of price. You will be told what they were, but those reductions have not been made in the slightest degree in consequence of the reserve-fund obliging them, but simply because in the progress of a commercial undertaking the price has been reduced with a view to stimulate consumption. That would also be the interest of the corporation or anybody who has the management of them. But there is another important matter, which is this—they say we should be worse off under the corporation than under the company. Why? The corporation management will save a great deal of money, and will increase the profits proportionately upon the manufacture of gas. The general economy and saving which will result from the corporation management of the gas-works surely should belong, if to anybody, to the people who have the trouble, who conduct the management, and who run the risk. Is it contended for a moment, as a matter of fairness and equity, that those gentlemen outside, who decline to find any capital, who decline to run any risk, who have nothing to do with the economy of management, are positively to have the whole advantage of the transfer to the corporation without sharing one atom of expense? That is what they ask. I do not think it reasonable, and I do not think you will think it reasonable, and we shall see before the end of the case whether you sanction it.

FRIDAY, APRIL 19.

Some general evidence was given as to the necessity of improved water supply and sewerage at Rumworth.

Mr. *Joseph Jackson*, C.E., examined by Mr. EDGE.

I am a surveyor, carrying on business at Bolton, and engineer to the Rivington Water-Works of the Liverpool Corporation. I was concerned in 1864 in making plans and surveys for the extension of the Bolton Water-Works at Turton. That scheme was for the purpose of supplying the increasing wants of the borough of Bolton, and also for the purpose of supplying Worsley, Little Hulton, and Clifton. Prior to that time there was a reservoir called the Turton and Entwistle reservoir for the use of millowners. That reservoir has not been completed. The supply from that reservoir was estimated to yield about 4½ million gallons a day. The Wayoh reservoir, which was to be made in lieu of this reservoir for compensation purposes, has not been completed yet. Halliwell and Heaton are within the limits of supply of the Corporation of Bolton. For some time past there has been an insufficient pressure in the higher parts of Halliwell and Heaton; and additional works have been proposed for the purpose of remedying that defect, by putting up the Sweetloves reservoir at a higher level. I expect when the corporation take water from the Turton and Entwistle reservoir, which is at a higher level, they will be able to supply all parts of the township. The corporation cannot take water from the Wayoh reservoir, because they will deprive the millowners of water, as that reservoir is intended as a substitution for the Turton and Entwistle reservoir. Instead of taking water from the Sweetloves reservoir, it is proposed to carry it through a pipe, which will be sufficiently high to supply the populous parts of Halliwell and Heaton. The South Lancashire Water Company have a right to supply the higher parts of Halliwell and Heaton, unless the Corporation of Bolton supply those districts within five years from the passing of this Act. The South Lancashire Water Company have not yet commenced operations. This line of pipes is, in fact, to enable the corporation to keep the ground which they now occupy. I think the putting down of the line of pipes in the manner proposed upon the plan is the most convenient and proper for the purpose of supplying Halliwell and Heaton. All that is wanted is really a right to lay pipes in the lands of Mr. Ainsworth and others. There is no intention whatever of taking any water from the lands of Mr. Ainsworth, or anybody else. The supply from the Turton and Entwistle reservoir will be ample for all purposes. I do not know what is the present supply of Bolton from the water-works. It would do no harm to the estate of Mr. Ainsworth to put these pipes through; it is a mere easement, for which, of course, he will be compensated.

Cross-examined by Mr. HOLKER: A portion of Halliwell is at present supplied from the water-works of the corporation. I do not know that there have been a good many complaints that the supply is insufficient. Sweetloves reservoir is in the township of Sharples, and pipes ran through that district into Bolton.

Mr. HOLKER: Could you from the Sweetloves reservoir supply the district of Worsley, Little Hulton, and Clifton?

Witness: I am not quite sure whether Sweetloves would supply them; there would have to be some new works, no doubt. I should think the Turton reservoir will be in operation next summer. At present we should not have an

abundant supply of water for the new district, but when the Turton and Entwistle works are completed there will be abundance for everybody.

By Mr. STEVENS: The Wayoh reservoir is the compensation reservoir for taking the Turton and Entwistle. No doubt the Wayoh will be finished next year, and then the Turton and Entwistle will come into operation. What we seek by this bill is the extension of the pipe through Mr. Ainsworth land to supply that district. As far as works go, that is all we seek. The Bolton Corporation have had power to supply the districts of Halliwell and Heaton for a good many years. There was a time when the higher part of Halliwell and Heaton was not worth supplying. This is the first year in which we come for powers to go through Mr. Ainsworth's land. When this Turton and Entwistle supply is enforced we shall be at a sufficiently high level to supply Halliwell, and we can do so, and that will be enforced probably next year.

Mr. STEVENS: Without constructing any additional works, and without going through Mr. Ainsworth's land, as I understand you next year, when your reservoirs are completed, you could equally supply those districts?

Witness: Possibly we could.

Mr. STEVENS: At all events you would be in a position legally to do so?

Witness: No; You could not without constructing additional works.

Mr. STEVENS: You say unless you give this supply within five years the powers of the South Lancashire Water Company come into play?

Witness: I believe that is so.

Mr. STEVENS: If you can next year, with your own works and without this bill, supply those parts of Halliwell and Heaton, will you explain to me what you want with the powers of this bill as a protection against the South Lancashire Water Company, which cannot arise for five years to come?

Witness: The corporation are coming for a general bill for other purposes; it would be a complete waste of money to come for a bill for that special purpose. Mr. Ainsworth is the proprietor of one of the most extensive bleaching-works in Lancashire. He has very valuable water rights and water springs on that property which were made the subject of very full and guarded clauses in the Act of last year. The South Lancashire Company, if they put their works into operation, are under stringent clauses for the protection of Mr. Ainsworth. We are not proposing to accomplish the same object, because we are not taking water from Mr. Ainsworth. The South Lancashire Water Company took every drop of the water from Mr. Ainsworth's estate, and therefore had to give him compensation. There is no proposition in this bill to supply that same district that I know of.

Mr. STEVENS: Was not the object of the South Lancashire Bill to supply the very parts of Halliwell and Heaton which this bill proposes to supply?

Witness: It was; but the South Lancashire Company was kept out for five years, to give the corporation time to supply if they thought proper. It had not been up to that time thought worth while; it would not have paid. The corporation refused to take the South Lancashire Water-Works, and to take all their liabilities to Mr. Ainsworth.

Mr. STEVENS: Supposing there is a clause in the bill which enables the Bolton Corporation to supply water in bulk to any company, and that your pipe passing through Mr. Ainsworth's land joins the pipe of the South Lancashire Company, would not that, by agreement, enable you to supply their district, and enable them to get rid of the necessity of constructing these works at all, including their obligation to Mr. Ainsworth?

Witness: It would enable them to sell water in bulk to the South Lancashire Company.

Mr. STEVENS: At a point below Mr. Ainsworth's property, obviating the necessity of constructing these compensation works for him?

Witness: It would, no doubt. Mr. Ainsworth would be as he is, with all his water rights intact. This is a mere passing of water from another district, which Mr. Ainsworth has no more to do with than this table, into another district beyond it.

Cross-examination continued: The pipe through Mr. Ainsworth's land would be, perhaps, a 9 or 10 inch pipe. This is not, in any sense of the word, a water scheme for the supply of Bolton: it is an extension of the supply to where they can get the water. The bill contemplates that they shall supply other districts than they now do. No doubt we are going to sell water to other districts which the town does not want.

By the CHAIRMAN: This bill does not affect any of Mr. Ainsworth's rights; but if the corporation sold water in bulk sufficient to supply the South Lancashire district, no doubt Mr. Ainsworth will be, to that extent, deprived of any advantage he has under the arrangement of last year. The effect of this bill would be to exclude the South Lancashire Company from this small district, which already belongs to Bolton.

Re-examined by Mr. EDGE: Mr. Ainsworth opposed the company's scheme last year. Parliament gave him this advantage, that if they took his water he was to be compensated for it in the usual way; but so long as the South Lancashire Water-Works are not made, Mr. Ainsworth is left as he was entirely. This line of pipes does not in any way interfere with any part of the water supply to Mr. Ainsworth. We do not propose to take his streams. Our pipes would be under pressure; we could not get the stream into them. It is simply a right to lay a length of pipes, paying an easement to Mr. Ainsworth. This bill does not give the slightest power to take a drop of water from him.

Mr. STEPHENS: The 27th clause takes power to "get and appropriate for the purposes of their water-works undertaking all springs, streams, and waters found in, on, or under any lands held by them for the purposes of their undertaking;" and that includes the lands of Mr. Ainsworth.

Witness: As I understand it, they do not take the land of Mr. Ainsworth; they do not buy it.

Mr. EDWARDS: There was a proposal made to leave out the words just read by Mr. Stephens.

Witness: When the Turton and Entwistle scheme of 1864 is completed, there will be an ample supply for all the inhabitants of all the districts proposed to be supplied by the Bolton Corporation for many years to come. The number of gallons per day that we shall then be able to give will be about 4,500,000.

Mr. STEPHENS: There is no doubt that the work as laid out will most distinctly interfere with our arrangements.

Mr. EDWARDS: We are perfectly willing to give a proviso with regard to that.

Mr. STEPHENS: If my learned friend will undertake the obligations which Parliament thought right for our protection last year, and will put the same words, *mutatis mutandis*, into this bill, I withdraw as far as any opposition to the water-works is concerned; but my strong objection is to the revolution which the present bill will make in the status of Mr. Ainsworth.

Mr. EDWARDS: We are not in any way taking any portion of Mr. Ainsworth's water, and though we are perfectly willing to give him a proviso to protect his springs from being interfered with by our line of pipes, it would be rather absurd for us to take upon us the burden of the South Lancashire water scheme and not get any compensation.

The CHAIRMAN: Are you going to sell your water to the South Lancashire Company?

Mr. EDWARDS: There is no arrangement as far as I understand. It is simply a power that we may do so.

The CHAIRMAN: If that arrangement is made, then, Mr. Ainsworth's arrangement with the South Lancashire Company would be completely annulled?

Mr. EDWARDS: The arrangement made was this: If you take my water, give me compensation; but the Bolton Corporation, supplying water to an adjoining district, were no parties to that arrangement at all.

The CHAIRMAN: But then, Mr. Ainsworth having made an arrangement with the South Lancashire Company, which he had reason to believe would be carried out, you now entirely prevent that.

Mr. EDWARDS: All that we ask for is power to construct a line of pipes.

Mr. STEPHENS: We are perfectly satisfied with things as they are. We say, though this bill is permissive on the face of it, it will practically repeal the whole of our arrangement.

Mr. *James Farrar*, examined by Mr. EDWARDS.

I am a civil engineer and surveyor for the township of Bury, and have a knowledge of the water-works which supply all the adjoining districts. At the time of the Act of 1864 I was engaged as engineer. The extension works then consisted of the Turton and Entwistle reservoir, and the Wayoh compensation reservoir. The Turton and Entwistle reservoir will supply about four and a half million gallons per day. The existing supply, until the Turton and Entwistle reservoir is completed, is about two and a half million gallons. I agree with what Mr. Jackson said with regard to the additional pressure that is required to supply the higher parts of Halliwell and Heaton. I think that can be most advantageously given by a connecting line of pipes such as has been indicated. The length of the main I propose to lay down is one mile and three quarters, with a 12-inch pipe. The pipes will terminate in Halliwell, in Mr. Tempest's land. The corporation will then be enabled to supply the district which was proposed to be supplied by the South Lancashire Water Company. I have had nothing to do with that company. None of their works have been constructed. It is not an uncommon thing in the manufacturing districts for corporations to supply outlying districts with water in bulk. I have known such provisions to be inserted in special Acts of Parliament. The object is to dispose of the surplus water. When the Turton and Entwistle reservoir has been put in proper order, and the Wayoh has been completed, there will be an ample supply of water for the whole of the proposed districts, leaving a surplus which may be advantageously disposed of. These are the only works that are proposed. The line of pipes can be laid down through Mr. Ainsworth's land without in any way interfering with springs or any water that may be on his property. At present Mr. Ainsworth's water to his works comes down the natural course of the brook, from the watershed of the South Lancashire Company. That will not be touched at all by our pipe; in every other respect Mr. Ainsworth will be left as he was before by the Corporation of Bolton.

Cross-examined by Mr. STEPHENS: When the Turton and Entwistle reservoir is completed, the total supply will be about 7 millions of gallons. The water from that reservoir will be conveyed through a tunnel to the town of Bolton. The pipe from the Sweetloves reservoir through Mr. Ainsworth's land will be a 12-inch pipe. My object in coming here is to state that I propose to lay down that pipe, and that it will do Mr. Ainsworth no injury. I have no plan to produce, as I was merely called in to make the survey for laying down the pipe through Mr. Ainsworth's land. That was subsequent to the passing of the South Lancashire Bill. The pipe will pass about a quarter of a mile above Mr. Ainsworth's bleach-works. Mr. Ainsworth has constructed a reservoir for the supply of his works, called the Limefield reservoir.

Mr STEPHENS: Have you considered what the effect upon that reservoir will be if your pipe should burst?

Witness: It will have no effect at all. If we were to make an agreement with any other public body, there is nothing that I am aware of to prevent their supplying other districts, except the limited size of the pipes. Of course there would be nothing to prevent them putting down a 24-inch pipe.

Mr. STEPHENS: Would it not be possible to supply the whole of the South Lancashire district?

Witness: I do not think it would be acting wisely to do so.

Mr. STEPHENS: Still it would be possible?

Witness: It would.

Mr. *J. L. Rushton*, examined by Mr. EDWARDS.

I am chairman of the Water-Works Committee of the corporation. I have known six schemes since 1843 for supplying water to the town. The works authorized by the Act of 1864 are not yet quite completed. The supply is not to be taken from the millowners till the Wayoh compensation reservoir is made. That will be next year. The present supply is 2,500,000 gallons per day; when the Wayoh reservoir is finished, we shall have more than 7 million per diem. The population within the limit of supply is 135,000. The South Lancashire Water-Works scheme was promoted by a company, and an Act was obtained last year. Under that Act there were compensation clauses secured to Mr. Ainsworth for giving him a certain supply of water, in consideration of their taking the power of impounding the water of the district, which previously supplied his works. No part of that scheme has been put in operation that I am aware of. It occurred to me that as their watershed was in the middle of our watershed, it would be desirable for the corporation to take over that scheme, if terms could be satisfactorily arranged. I saw Mr. Ainsworth upon the subject, and he expressed a willingness to let the scheme for the construction of the reservoir be delayed for some years, upon the understanding that the corporation should take it up. The corporation, however, thought it would be involving them in too large a scheme, and they eventually declined to sanction that. I thought it would be a prudent measure, and I think so still; but the corporation do not think so. Whilst those negotiations were going on we were preparing our plans. The reason of our wanting to lay down the line of pipes is that the Turton and Entwistle reservoir gives us an average pressure of 120 feet more than Sweetloves. If our scheme is carried out, Mr. Ainsworth's position will be exactly the same as before the South Lancashire scheme was brought forward, with the exception of his having incurred expenses last year in protecting his interests. There is nothing in this bill to prevent the South Lancashire scheme being carried out.

Cross-examined by Mr. STEPHENS: We propose to take compulsory powers to lay mains through Mr. Ainsworth's property as through any other land. We propose to carry a main through Halliwell and Heaton, so as to supply the higher portion, which we cannot supply from our present reservoir. I was overruled by the corporation in the matter of the negotiations with the South Lancashire Company.

(To be continued.)

Legal Intelligence.

COURT OF QUEEN'S BENCH.—THURSDAY, MAY 9.

(Sittings in Banco after Term, before Justices BLACKBURN, MELLOR, and LUSH.)

THE GASLIGHT AND COKE COMPANY *v.* THE VESTRY OF THE PARISH OF ST. GEORGE, HANOVER SQUARE.

Mr. C. POLLOCK, Q.C., and Mr. BESLEY, were for the plaintiffs; Mr. POWELL, Q.C., and Mr. STREETEN for the defendants.

This was a special case for the opinion of the court upon the construction of the Metropolis Gas Acts, 1860 and 1868. The action out of which it arose was tried before Justice Mellor and a special jury on the 13th of Feb., 1871 (reported in the JOURNAL OF GAS LIGHTING, vol. xx., page 147). It was brought to recover the sum of £2160 5s. for gas supplied by the plaintiffs to the public lamps of the defendants parish during the first six months of 1870. The defendants paid into court the sum of £1787 1s. 7d. After the case had been opened at some length, it was suggested by the learned judge that it involved questions which it was impossible satisfactorily to dispose of at Nisi Prius, and that the best thing would be to state a special case, setting out the various sections of the Acts for the opinion of the full court thereon. This course was agreed upon,

and a verdict was entered for the plaintiffs, subject to a special case to be stated by Mr. Manisty, and damages, if any, to be found by him beyond the amount paid into court.

Mr. POLLOCK said there was no dispute as to all the gas charged for having been supplied by the plaintiffs, and having been consumed by the defendants, but as he understood the case, there were two points that would be raised by the defendants—the first being, that the gas must be taken to have been supplied under the provisions of the Metropolis Gas Act, 1860, which the plaintiffs disputed. But although it appeared to him that ultimately it would be immaterial whether this were so or not, the case provided that in such an event the matter should go back to Mr. Manisty, to whom the question of damages was referred. The second point which the defendants took was this, that the gas actually supplied was, with respect to a portion of it, Newcastle coal gas, *i.e.*, common coal gas, whereas they were, as they alleged, entitled to be supplied with cannel coal gas. He, however, did not see how this point arose upon the case; certainly it did not arise upon the questions in the case.

Justice BLACKBURN remarked that if the price of the two articles was different, and if an inferior article had been supplied, it would reduce the damages.

Mr. POLLOCK submitted that it would not, because the price was rateable—the defendants paying by illuminating power and not per cubic foot. With respect to the first point, he did not propose to deal with it until he had heard what was said on the other side, for this reason, that at the end of the case it was stated that the questions for the opinion of the court were whether the provisions of the Metropolis Gas Act (1860) were in force, and binding upon the company with respect to the supply of gas to the 1162 public lamps for which the action was brought. If the court decided the question in the affirmative, the verdict entered for the plaintiffs was to be vacated, and a verdict entered for the defendants with costs; otherwise, it was to stand for the plaintiffs, with costs, for such an amount, beyond the sum paid into court, as Mr. Manisty found to be due and should direct.

Justice BLACKBURN: If that be so, whether right or wrong, we must see whether the Act applies.

Mr. POLLOCK said that was in reality the only point, and he did not say so without reason, because the case unfortunately set out a very long correspondence between the parties, and also several contracts, which did not appear to him to have much bearing on the matter, and he wished to avoid going into them more than was absolutely necessary. The action was, as he had informed the court, for gas supplied to the parish of St. George, Hanover Square, for the public lamps, during the first two quarters of the year 1870, and also for maintaining, cleaning, and keeping in repair the said lamps; and it was stated in the first paragraph of the case that the amount claimed was £2160 5s. 11d. The vestry had paid into court the sum of £1787 1s. 7d., and denied their liability to pay the residue. At the trial, before Justice Mellor and a special jury, in February 1871, a verdict was recorded for the plaintiffs for the balance of £373 4s. 4d. The claim of the plaintiffs included a charge for a supply of gas to four private lamps, but this was immaterial. Of the 1162 public lamps, it appeared that 942 were supplied with cannel gas of an illuminating power of 23 candles, the consumption of each being taken at 2½ cubic feet perhour. The remaining 220 lamps were supplied with common coal gas, of an illuminating power of 16 candles, and the consumption of each was 4 feet per hour. Their lordships would therefore see that the price was one thing and the illuminating power was another. Paragraph 7 of the case stated that upon an estimate of the yearly consumption of cannel gas by each lamp, and for the repairs, &c., the company charged £3 14s. 4d., and upon a similar estimate for the consumption of common gas, and repairs, &c., the charge was £3 19s. 8d., but as the company could not supply cannel gas to all the lamps, those which consumed common gas were also charged £3 14s. 4d., including the repairs; so that practically they charged the same, and, as they alleged, gave as nearly as could be the same illuminating power.

Mr. STREETEN said the objection of the defendants on this part of the case was not that they had not sufficient illuminating power, but that they had impure gas—*i.e.*, gas made from Newcastle coal, which contained a large amount of sulphur impurities.

Mr. POLLOCK said he could not find in the whole of the case any statement as to impurity, or any point of that kind made at all.

Justice LUSH (to Mr. Streeten): Do you say that you ought to have had all cannel gas?

Mr. STREETEN: Yes, all.

Justice BLACKBURN: That seems to be admitted. As I gather from paragraph 6 of the case, it seems that the company do not deny that they ought to have supplied all cannel gas, but that not being able to do so they supplied common gas.

Mr. POLLOCK said the company did not admit it. It was an impossibility, as the defendants knew, and the next paragraph of the case stated that "the gas-mains are the property of the company, and are laid down by, and are under the control of, the company; and the company have full power to lay down and carry their cannel gas-mains under and along such parts of the parish, but the public have no power to require, nor are the company under any obligation to lay mains for the supply of a particular kind of gas. The company, under the provisions of The Gaslight and Coke Companies Act, 1870, can discontinue the manufacture and supply of cannel gas altogether upon giving three months notice thereof." This was merely to show that the thing was optional on their part. "In certain parts of the parish there were and are no cannel gas-mains, of which fact the vestry had notice, and knew that cannel gas could not be supplied in those parts of the parish, and it was agreed in the year 1857 between the company and the vestry that in those parts burners should be used which consumed 5 feet per hour of common gas, which is equal to 2½ feet per hour of cannel gas"—it would be seen afterwards that this latter quantity was reduced—"of the illuminating power of 15 candles, and that a uniform charge per lamp should be made to the vestry for a uniform illuminating power throughout the parish." By the contract which the company made with the vestry in 1857 for the supply of gas to the public lamps for three years there was a covenant to supply them in this way; and it was also provided that such gas should be "free from sulphur and ammonia, and to be well and sufficiently purified, so as that the said gas shall give a clear, white, and brilliant light, agreeably to the true intent and meaning of this contract." The case then stated that "Previous and up to the 28th of August, 1860, the date of the passing of the Metropolis Gas Act, 1860, the supply of gas was under the contract between the company and the vestry before set out for the supply of gas to the public lamps, and upon the terms therein stated." By section 25 of that Act it was enacted that "the quality of the common gas supplied by any gas company shall be, with respect to its illuminating power at a distance as near as may be of 1000 yards from the works, such as to produce from an Argand burner, having 15 holes and a 7-inch chimney, consuming 5 cubic feet of gas an hour, a light equal in intensity to the light produced by not less than 12 sperm candles of six to the pound, each burning 120 grains an hour." And with regard to the cannel gas, "It shall with respect to its illuminating power at the distance aforesaid be such as to produce from a bat's-wing or fishtail burner, consuming 5 feet of gas per hour, a light equal in intensity to 20 such sperm candles. And each such gas shall, with respect to its purity, be so far free from ammonia and sulphuretted hydrogen, that it shall not discolour either turmeric paper or paper imbued with acetate or carbonate of lead, when those tests are exposed to a current of gas issuing for one minute under a pressure of 5-10ths of an inch of water." He might tell their lordships that there was no finding either way in this case about the purity of the gas.

Justice BLACKBURN: If the Act of 1860 applies, there is to be a verdict for the defendants. I presume it is found that the gas is to be equal to the requirements of the contract?

Mr. POLLOCK, said it was, and it would therefore go back to Mr. Manisty upon that if necessary. By the 36th section of the Act of 1860, it was provided that all contracts existing before the 1st of January of that year should terminate on the 1st of February, 1862, previous to which time the provisions of this Act relating to price, purity, and illuminating power, should not apply to any company included in the Act unless such company elected to adopt them. This company did not elect to adopt them, but continued to supply the vestry on the same terms as previously. On the 22nd of February, 1861, the vestry wrote to the company this letter:

Gentlemen,—I am instructed by the vestry of this parish, at a meeting holden yesterday, to apply to you to know at what price per lamp you will be willing to supply the public lamps of this parish, situate in your district, with gas for one year next ensuing, from the 25th day of March, 1861; such charge to include the lighting, cleansing, keeping in repair, and painting the lamps, posts, &c., as at present.

I remain, &c., T. B. CHAPPELL, Vestry-Clerk.

In this letter they did not say anything about the kind of gas to be supplied On the 26th of February the secretary of the company replied as follows:—

Sir,—I am favoured by your letter of the 22nd inst., which I submitted this day to my board. To the inquiry contained therein—namely, to be informed at what price per lamp this company will be willing to supply with gas the public lamps in the parish of St. George's, Hanover Square, and situate in their district, for one year, from the 25th of March, 1861, including the lighting, cleansing, and painting the lamp-posts, &c., as at present, I am to reply by sending you a copy of the scale of charges which this board has adopted and transmitted to every parish on entering into a new contract, leaving to the vestry the selection of the consumption of gas they may prefer—viz., 2 feet per hour, cannel gas, £2 11s. each lamp per annum; 2½ feet per hour, £3 6s.; 3 feet per hour, £3 18s.; 4 feet per hour, £5 2s.; and 5 feet per hour, £6 12s., exclusive of 15s. per lamp for lighting, repairs, &c.

(Signed) C. BURLS.

Justice BLACKBURN: They only mention cannel gas—there is no reference to common gas at all.

Mr. POLLOCK said no doubt it was so, and he was told it was a mistake not to mention the other gas. But as their lordships would find, the company continued to supply both, and inasmuch as the price was always regulated by the illuminating power, he submitted that it was immaterial.

Justice MELLOR: I see they use the words "as at present."

Mr. POLLOCK said on the 7th of March, 1861, the vestry replied:—

Gentlemen,—I am instructed by the vestry, at its meeting this morning, to inform you that they have agreed to accept your offer to supply the public lamps with cannel gas, burning 2½ feet per hour, for £3 6s. each lamp for one year, from the 25th of March, 1861, and a further charge of 15s. per annum for lighting, cleansing, painting, &c., making the charge, as at present, £4 1s. for each lamp per annum.

(Signed) T. B. CHAPPELL, Vestry-Clerk.

This was, therefore, only a contract for one year, but their lordships would find throughout the case that the vestry were aware the company had no cannel mains in a portion of their district. In consequence of the illuminating power of the common gas having been increased, the company, for the purpose of giving a uniform light throughout the parish, substituted a burner consuming 4 feet of that gas per hour instead of 5 feet. In December, 1865, they reduced the price of their gas, and on the 15th of that month they addressed this letter, in the form of a printed circular, to the vestry:—

Sir,—I am instructed by the directors of this company to inform you that, in consequence of the reduction which will take place in the price of the company's gas after Christmas next, their charges for the supply to public lamps from that period will be as follows:—

Then followed a scale of charges for both "common gas," and "cannel gas," which it was not necessary to read, and it continued:—

I would be obliged by your informing me whether, under the above reduced scale, it is the intention of your vestry to continue the use of burners consuming 2½ feet of cannel gas per hour.

I am, &c.,

(Signed) J. O. PHILLIPS, Secretary.

The vestry made no reply to this letter, and the gas was supplied to the public lamps in the manner prescribed—viz., by burners for cannel gas consuming 2½ feet, and for common gas 4 feet per hour. The charge was made upon the reduced scale, and the vestry paid, without remonstrance or dissent, down to the end of 1869, upon these terms. There now came a sort of conflict between two Acts of Parliament, on which the other side, as they said, rested their case.

Justice LUSH: You say that the Act of 1868 exempts you from the operation of the Act of 1860?

Mr. POLLOCK said it was so. There were two Acts passed in 1868, which received the Royal Assent on the same day, one being an Act relating to the City of London, but amending the Metropolis Gas Act, 1860, the other a private Act of this particular company. The former for the first time appointed gas examiners, whose duty it was each day to make and deliver a report of the result of the testings made by them to the corporation, to a chief gas examiner, and to the gas companies. This Act in terms only applied to the City, but by certain provisions it was made to apply to other parts of the metropolis. By section 53, it was enacted, that the common coal gas supplied by each company should, from the 30th of September, 1868, until the 1st of January, 1870, both inclusive, be of an illuminating power not less than 14 candles, and after that period it was to be raised to 16 candles.

Justice BLACKBURN: If this Act applies, the period during which the gas was supplied would be within the new tariff or arrangement.

Mr. POLLOCK: I think that is the whole question in the case, whether the supply was governed by, and subject to the Act of 1860, or that of 1868; but that is not their point. Their point is with regard to the purity of the gas. Your lordships will remember that under the Act of 1860 there was a specific test prescribed for the amount of sulphur. By this Act that section is repealed, and in place of it gas examiners are appointed, and a chief gas examiner, to whom there is a power of appeal.

Justice BLACKBURN: As far as this Act goes, as it only repeals the provision within the City, it would not repeal them here.

Mr. POLLOCK: Your lordships will take it for the purpose of this case that this is applicable to my district.

Justice BLACKBURN: That we shall see hereafter. It is a hard task the Legislature puts upon us. I am endeavouring at present to understand each of these Acts separately. How they have altered them afterwards we will find out. But as far as this Act is concerned it will not affect it in this respect; the purity would remain as it was before. What is the clause in the Act of 1868 which regulates the purity within the City of London? I suppose there is one.

Mr. POLLOCK: No.

Justice BLACKBURN: Do you mean to say that it repeals the purity clause in the old Act, and substitutes nothing for it?

Mr. POLLOCK: No; they have repealed the purity clauses, but they have left it in the discretion of the gas examiners. The question of sulphur is left to be decided by the gas referees, who are appointed by the Board of Trade.

Justice BLACKBURN: The gas referees are to settle and decide the mode to be adopted for testing the purity of the gas.

Mr. POLLOCK said their lordships would see presently what had been done. On the 15th of December, 1869, the plaintiffs wrote to the defendants as follows:—

Sir,—I am instructed to inform you that, in pursuance of the City of London Gas Act, 1868, the illuminating power of the common gas supplied by this company will, on and

after the 1st day of January next, be increased to 16 candles, and the price will be at the same time reduced to 3s. 9d. per 1000 cubic feet. The illuminating power of the cannel gas will, on and after the same date, in pursuance of the same Act, be increased to 23 candles, and the price will be reduced to 5s. 5d. per 1000 cubic feet.

(Signed) J. O. Phillips, Secretary.

It being found in the 21st paragraph of the case that the cannel gas supplied to the vestry was of the illuminating power of 23 candles, and the price named in the said letter was according to the requirements of the 56th section of the City of London Gas Act, 1868, it shut the defendants out as to any questions of illuminating power or price, and left them, as the sole question they could now raise, the question of the purity of the gas. The case set out the 109th section of the Gaslight and Coke Companies Act, 1868, which Act was passing through Parliament at the same time as the City of London Gas Act, 1868, and therefore being *in pari materia*, these Acts must be construed as being in conformity with each other, if possible. The 109th section was this:—

If the bill, the short title of which, when passed, is intended to be the City of London Gas Act (in this Act referred to as the City Gas Act), now pending, pass into a law in the present session, then the company and their undertaking shall be subject to the provisions of the City Gas Act, without as well as within the City of London, and the liberties thereof, and such Act shall extend to the whole undertaking of the company; for the purposes of the City Gas Act in relation to the undertaking of the company beyond the limits of the City of London and the liberties thereof, the Metropolitan Board of Works shall have all the same rights, powers, authorities, and obligations as are given to or imposed upon the mayor, aldermen, and commons of the City of London in the City Gas Act, as fully as if that board had been named in such Act, instead of the said mayor, aldermen, and commons, so far as relates to the undertaking of the Company beyond the limits of the City.

Therefore, he submitted, the effect of that section was this, that the whole of the company's district, from the time of the passing of the Act, was to be taken as if it were within the City, only the Metropolitan Board of Works were to be the body to whom they were ultimately responsible in the portion of it beyond the City.

Justice Mellor: It is to be applied to your company with a different set of officers.

Mr. Pollock: Just so; and if this construction were correct, then sections 25 to 34 of the Act of 1860 were repealed *quo ad* this company's Act, because they could not be under two jurisdictions. The 110th section said:—

Nothing in this Act contained shall exempt the company or their gas-works from the provisions of the Metropolis Gas Act, 1860, or the Act for regulating measures used in sales of gas, as amended by subsequent Acts, or any other general Act already or hereafter to be passed in the present or any future session of Parliament for regulating gas companies in the metropolis, or for regulating supply or sale of gas in the metropolis, and applicable to the company, or from any future revision or alteration by Parliament of gas-rents and meter-rents by this Act authorized.

Justice Lush: There is no such provision in the City Gas Act.

Mr. Pollock: There is not.

Justice Blackburn: What does the Legislature mean when, in clause 109, it says, by reference to another Act, that they shall be exempted from the provisions of the Act of 1860, and in the very next clause it says they shall not?

Mr. Pollock: I do not know that in this case the Legislature is really deserving of such blame, and for this reason—if you take the Act of 1860, and remember that the clauses which are repealed are only, for this purpose, from 25 to 34.

Justice Blackburn: They are very important provisions.

Mr. Pollock: So they are, but though they are important they are replaced, or the object of them is satisfied, by other clauses in the City Gas Act.

Justice Lush: If your construction of the 110th section be the correct one, there was no need to put it in at all.

Justice Blackburn: Might it not mean that the Legislature said, "We are content to oblige you by putting you under the restrictions of the City of London Gas Act, but we will not set you free from the other Act. There is a minimum purity under the Act of 1860; you shall be bound by that, but if the referees find you can give them a greater purity, you shall be bound by that and shall make it more pure; still, we shall not let you off the provisions of the Act of 1860."

Justice Mellor: The gas consumers are to have the benefit of both Acts.

Mr. Pollock: That would be a very hard construction upon us.

Justice Blackburn: I only throw out a suggestion whether that is not the construction of the words the Legislature has used.

Justice Mellor: Probably it is. The plan provided by gas-inspectors, gas-examiners, and referees may be better; it is a better plan for securing purity than the other, but supposing it is not, then the question is whether you are released from the other Act.

Justice Blackburn: We must never carry it too far, but to some extent we must remember that an Act promoted by a company is the language of the promoters, *i.e.*, the language of the company.

Mr. Pollock: Your lordships see that but for that clause we should have gone on under the Act of 1860, which would have been a much more profitable Act for us. That is quite clear, because we have had to raise our illuminating power from 12 to 16 candles, and it would be rather a hard construction to say that the effect of these two sections shall by some implication be such as your lordship now suggests.

Justice Blackburn: You came promoting an Act, asking a great many boons from the Legislature. The committee say, "We will grant you this Act, but we will attach a condition to it, viz., that all those other restrictions and things for the benefit of the public which the City of London Act contains and provides for shall apply to you, but the freeing clauses of that Act, which take off your restriction, shall not apply. Supposing the committee meant to say, "You shall be subject to it as far as the public get any benefit from it, but so far as the public would be deprived of any benefit, you shall not." Have they not expressed that by sections 109 and 110 of this Act?

Mr. Pollock said that could only be so as regarded the City, but other persons would be affected by it. For instance, by the 27th section of the Act of 1860, the local authorities were bound to provide testing apparatus and to appoint examiners. Was it to be considered that the Legislature intended this to be continued, and thus a double process be carried on?

Justice Blackburn said he saw no difficulty in the matter. The Legislature might intend the company to be subject to both restrictions.

Mr. Pollock said the 25th paragraph of the case stated that "the company contend that their whole undertaking is subject to the provisions of the City of London Gas Act, 1868, as to illuminating power, price, and purity of the gas, and not to the provisions of the Gas Act, 1860, which, so far as the company are concerned, is repealed in those respects as well as the mode of testing. The vestry contend that the provisions of the Metropolis Gas Act, 1860, are, so far as the company are concerned, with and as affects the said supply of gas to the said 1162 lamps unrepealed and in full force. In pursuance of the City of London Gas Act, 1868, the Board of Trade have appointed gas referees, and fixed testing-places, where the gas is daily tested, and the gas examiners have daily furnished the Board of Trade, the chief gas examiner, and the company, the results of the previous day's testing. All the gas supplied to the vestry has been daily tested accordingly, at 17, Arundel Street, Haymarket, and daily reports of illuminating power and purity have been furnished by the gas examiner. From these reports it appears that the gas supplied during the said six months by the company to the vestry was above the illuminating power and purity required by the Act of 1868, except on two occasions—viz., the 4th of May and the 15th of June, when the common gas was 15·6 and 15·9, instead of 16 candles, and on the 17th of January and the 11th of June, when the cannel gas was 22·5 and 21·1 instead of 23 candles."

Justice Blackburn: If you have complied with both Acts, it seems to me not to be material whether you are under them both or not.

Mr. Pollock said if the company had not complied with the requirements as to purity, it was for the gas referees to have shown it. But up to the present time the referees had not certified the number of grains of sulphur beyond which the gas should not be allowed to be charged. When the plaintiffs applied for payment of the first quarter's account now in dispute, the vestry replied by forwarding a resolution come to by them on the 5th of May, 1870, as follows:—

That the accounts of the Chartered Gas Company to Lady-day last be disputed on the twofold ground that the common gas is not of the quality specified in the circular of the gas company of December, 1869, and that the cannel gas, as represented, is not such, but gas made from a mixture of inferior coal.

There was not one word in support of either of these propositions, nor did the vestry, before the action was brought, make any complaint whatever of the purity or quality of the gas being supplied during the half year in any other way. They now complain that the company did not during those six months supply such gas to the lamps as they were bound to supply, and that on the facts stated they were not liable, if at all, beyond the amount paid into court. "The question for the opinion of the court is whether the provisions of the Metropolis Gas Act, 1860, are in force and binding on the company as respects the supply of gas to the said 1162 lamps." He (Mr. Pollock) did not know that he had to contend that here. If necessary he could say that there was nothing in this Act of Parliament, or any where, to show that if the gas was a little behind what it ought to have been either in purity or illuminating power, the vestry were not to pay for it.

Justice Blackburn: If we decide that the Act of 1860 does still apply, it will be for Mr. Manisty to ascertain whether there is to be an amount of deduction, and what amount. If the money paid into court is sufficient for payment of what is due to the company that will be a verdict for the defendants.

Mr. Pollock: The amount paid into court is omitting the common gas. They say they will not pay for that at all.

Justice Blackburn: The result may be, notwithstanding the Act applies, you may be entitled to a verdict for something before Mr. Manisty. We have solely to inquire whether the Act is still in force, and let Mr. Manisty apply it.

Mr. Streeten: Provided the plaintiffs are entitled to recover at all in respect of the common gas.

Justice Blackburn: If there is any clause in the Act of 1860 which says they shall not recover at all for any gas of a purity less than the statutable purity, that will be another question.

Mr. Streeten: There is no such clause.

Justice Blackburn: Mr. Pollock, does not it seem very much reduced to this. What is the true construction of the 109 and 110 sections of the company's Act?

Mr. Pollock said it did; but there was one section in the Act of 1860 which was important. The 26th section enacted that if the gas so supplied by the company at any time was below the standard purity, the company should forfeit, on summary conviction before a police magistrate, a sum not exceeding £50 for every offence. It was worthy of observation that though the vestry refused to pay the company's account, they had never attempted to put this stringent clause into force.

Justice Mellor: Might not that be an argument against your recovering, supposing the fact to be that you are liable to a penalty for supplying gas of less purity than that prescribed by the Act?

Justice Lush: That would not entitle you to recover the price of pure gas if you have not supplied pure gas.

Justice Blackburn: I should suppose, in the absence of some stringent clause, saying you shall not recover at all, and shall not be paid at all unless it is pure, the question before the arbitrator would be on a *quantum meruit* for what you supplied pure and what you supplied impure.

Mr. Pollock: All that I ask your lordships to do is to put a reasonable construction on the two sections of the Act. If your lordships put us under both Acts we might be summoned and fined £50 under the Act of 1860, and yet be liable to the provisions of the Act of 1868 with regard to the referees and gas examiners, which would be cumulative.

Justice Blackburn: And why not? I cannot help thinking it would be a most plausible argument to adduce before the committee, that as you were then asking for a boon you should be placed under the additional securities by the public Act then passing through Parliament. The committee might say, "If you choose to ask for this Act it shall be granted you on the condition that you are subject to all the existing reductions in favour of the public, and also to those which may be imposed by the City of London Gas Act."

Justice Lush: Then the public would have the benefit of having the gas periodically tested by competent persons, and not be at the expense themselves of ascertaining whether you were sending out pure gas or not.

Justice Blackburn: A further benefit of the City Gas Act is that the referees have power (although you furnish gas of a purity equal, practically, to the requirements of the Act of 1860), whenever they perceive that you can supply gas of a still greater purity, to order you to do it. There is nothing unreasonable in saying we will not let you off the minimum degree of purity.

Justice Lush: If the gas referees have not prescribed a minimum, you have none except that fixed by the Act of 1860, and you might supply any sort of gas you like.

Justice Blackburn: There are two conditions imposed on you—the first, by section 109, you shall be subject to anything that is for the benefit of the public in the Act in question; the second, by section 110, you shall not be let off anything in the other Act that is for the benefit of the public. That answers the question at once: you are subject to the Act of 1860. Then Mr. Streeten says the effect of that is that you can recover nothing for the gas that is impure.

Mr. Pollock: I shall not argue that now.

Justice Blackburn: We must not decide against Mr. Streeten without hearing him on that point.

Mr. Pollock: That point is not raised in the case. The only point is whether the Act of 1860 applies.

Justice Blackburn: Looking at the two questions, if we decide that the Act of 1860 applies, we are to send the case back to Mr. Manisty to enter the verdict for the defendants, or otherwise, as it may seem proper to him. If we decide otherwise, then is the verdict to stand for the plaintiffs, or is it to go back, subject to such reduction in the amount as he may think proper to direct?

Mr. Pollock: That is what was intended at the trial.

Mr. Streeten: I am quite satisfied that it should go back to the arbitrator, to be settled upon a *quantum meruit*.

Justice Blackburn: Unless you have something more to say, Mr. Pollock, we are perfectly well satisfied that the Act applies, and that you are subject to it. I think the moment we understand these two sections, it is obvious they are meant as conditions imposed upon granting you a bill conferring additional powers and privileges. You are asking for a boon, and the Legislature or the committee say, "If we grant it to you, we will put you under two conditions. The one is to subject you to the restrictions imposed by the Metropolis Gas Act, 1860—we continue them; the other, that you shall not be relieved from the restrictions of this Act." If you were satisfied with those two conditions, they would grant you your bill.

Mr. Pollock: I would ask your lordships is it consistent to say that these two Acts of Parliament can co-exist?

Justice LUSH: Yes.

Mr. POLLOCK: I am now on the question of quality. If they exist for one purpose, they exist for another. Suppose we continued to supply gas of the quality prescribed by the 25th section of the Act of 1860—is that repealed or not?

Justice MELLOR: So far as the present action is concerned, the referees have done nothing to impose upon you any greater obligation. They have not acted so far as you are concerned.

Justice BLACKBURN: The 8th section of the Act of 1868 says, "The company shall be and continue subject to the powers and provisions of the Metropolis Gas Act, 1860, and of any Act passed or hereafter to be passed for amending the same, and entitled to the powers and privileges of those Acts, as if this Act were not passed, so far as the same are not varied by this Act." Therefore, it is quite plain that what I previously conjectured is right—that section 109 was put in as a condition, which was stipulated for, imposing upon the company certain restrictions, and section 110 is a supplement to it.

Mr. POLLOCK: It would be very favourable to us if we continued subject to the Act of 1860. Are we entitled to the powers and privileges of that Act?

Justice LUSH: Certainly.

Justice BLACKBURN: You are subject to the other restrictions as well.

Justice MELLOR: You are not privileged to burn common coal when you ought to burn cannel?

Mr. POLLOCK: Is it reasonable that these two Acts should co-exist? By the 25th section of the Act of 1860, we are bound to give gas of an illuminating power of 12 sperm candles; by the City of London Act of 1868 we are bound to give 16-candle gas.

Justice BLACKBURN: If you give 16 you give 12.

Justice MELLOR: They have power to put you under certain conditions. They have not, perhaps, wholly adapted their language to what they intended, but they have taken good care you should not have the Act without putting you under those conditions. You need not have accepted them—you might have withdrawn your bill.

Mr. POLLOCK: Supposing it were not a gas company, but some other company, and you found in an Act incorporating that company strong words (and these are strong words) subjecting them to certain provisions, and if you found in another Act provisions subjecting them to new rates, and new modes of dealing with the subject, what construction would your lordships put on such provisions?

Justice BLACKBURN: I should not have the slightest difficulty if it were an ordinary contract between persons situated as these parties were. If I made a bargain with a gas company that they were to supply me with gas of a certain degree of purity, and they came forward and asked to be let off that part of the contract, why should I not say, "The contract shall stand, provided you give me 16-candle gas instead of 12—*i.e.*, 4 in addition." Why should I not do that?

Mr. POLLOCK: It is perfectly consistent to say that the Act shall apply, and that with it the repealing powers shall also apply.

Justice BLACKBURN: I do not think it is consistent with the 110th section that the repealing power shall apply. It is quite plain that section 109 says you shall be subject to all the restrictions and burdens of the new Act, and section 110 says you shall not be let off by the new Act from any of the burdens or restrictions of the first Act.

Justice MELLOR: They seem to have taken a particular course in that respect.

Justice BLACKBURN: It seems really quite hopeless, Mr. Pollock, that you can persuade us the Legislature did not know what they meant to say, or that they have not said it most effectually. We answer the question put to us in the affirmative.

Mr. STREETEN: I apprehend it will be a verdict for the defendants, with costs?

Justice BLACKBURN: No; I think not. The result is to send the matter back to Mr. Manisty, to decide whether he will find a verdict for the defendants with costs or not.

Mr. STREETEN: The intention was that if the Act of 1860 was decided to be in force the plaintiffs were in the wrong, and we were to have a verdict, with costs; but if we still went on contending that we were not liable to pay for the common gas, then Mr. Manisty was to say upon a *quantum meruit* what we ought to pay.

Justice BLACKBURN: It is not so expressed. It is impossible to read it that way. It goes back to Mr. Manisty, and if it is proved (which does not seem to have been found as a fact) that the gas was impure, he will say how much deduction shall be made, and if that deduction covers all the amount in dispute then the verdict will be for the defendants, otherwise it will be for the plaintiffs for such sum as he thinks fit.

Mr. STREETEN: I certainly had a strong impression that there was to be an end of the case, subject to the question of our paying for the common gas.

Justice BLACKBURN: It would be a monstrous injustice, and a very hard bargain for the company, that if there were a single foot of gas deficient, or a single grain of sulphur beyond the purity prescribed, they were to forfeit the whole. The case goes back to Mr. Manisty with our decision that the Act of 1860 does apply to the company; that is all it comes to—it goes back to him to deal with as he thinks right.

CAMPBELL *v.* THE EAST LONDON WATER-WORKS COMPANY.

Sir G. HONYMAN, Q.C., and Mr. COHEN argued for the plaintiff; Mr. POLLOCK, Q.C., and Mr. LANYON for the defendants.

This was an action brought for not supplying the plaintiff with water for other than domestic purposes. The questions for the court were raised by demurrers to two pleas. By the defendants private Act they are bound to supply water at special rates for other than domestic purposes; for instance, for garden or stable use, and the plaintiffs now sued them for a breach of their agreement to do this. The defence set up in the fourth plea was that by the Water-Works Clauses Act (1847), the defendants are bound, in the event of fire, to supply water for the purpose of extinguishing it before supplying it for any other purpose, and that there was a fire on the occasion complained of, and hence the deficiency in the quantity of water supplied to the plaintiff. In the fifth plea the defendants alleged that by their private Act they were excused for a deficiency in the supply of water, if that was occasioned by "frost, drought, or other unavoidable accident."

The court gave judgment for the defendants on the fourth plea, observing that the Act of 1847 cast on them a public duty, which was paramount to the private right of the plaintiff, but on the fifth plea the court gave judgment for the plaintiff, remarking that "other unavoidable accidents" must mean accidents *ejusdem generis* with those mentioned in the section—namely, frost or drought—and that they would not cover the accident in this case, which was fire.

RUGBY GAS COMPANY.—The gas-works at Rugby having become too small for the wants of that rising town, the directers some time since resolved to erect larger and more convenient works adjoining the London and North-Western Railway. These works have now been in operation for the last twelve months, and the directors are so well pleased with the ability displayed by Mr. P. Simpson, their engineer and manager, in designing and carrying out the undertaking, that at their meeting held on the 6th inst. it was unanimously resolved that his salary be increased £50 per annum from last quarter-day; and that he be presented with one hundred guineas, and a gold watch and chain with suitable inscription, as a mark of their appreciation of his services.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board on Friday, May 10, Mr. DALTON brought up a report from the Parliamentary Committee, on the regulations for a constant supply of water made by the metropolitan water companies, and submitting a series of amended regulations to be proposed to the Board of Trade, in substitution for those made by the companies. He said that the board were aware that under the Metropolis Water Act, 1871, the companies were authorized to prepare regulations preliminary to the constant supply of the metropolis. These regulations were to be submitted to the Board of Trade, and the Metropolitan Board had power to appear before the Board of Trade, and point out any objections they might entertain towards the company's regulations. The companies prepared their regulations, and submitted them to the Board of Trade, and the Board of Trade had sent copies of those regulations to this board, asking them to make any suggestions respecting them which they thought proper. The board referred the matter to the Parliamentary Committee, and authorized them to engage an eminent hydraulic engineer. They did so, and in March last they reported to the board a preliminary report. Subsequently they had a more complete report from Mr. Bramwell upon the whole of the regulations, and they then applied to the Board of Trade for longer time for consideration, and they were given to the 15th of this month. The report of Mr. Bramwell had been printed, so that the members had had a full opportunity of perusing his remarks upon the regulations of the water companies. Subsequently the committee thought that if they were to oppose those regulations they ought to be prepared with some counter regulations to put before the Board of Trade in lieu of those objected to. They, therefore, instructed certain gentlemen to prepare objections, and after going thoroughly into the matter they had reported to the Parliamentary Committee, who now brought up the counter regulations asking the board to submit them to the Board of Trade. The regulations of the water companies appeared to have one object in view, and that was to prevent waste of water, which was a very important element of consideration, but they seemed to confine their regulations entirely to that one object, and no doubt if they were carried out there would be very little waste of water. But if these regulations were to be carried out it could only be done at a cost of £2,000,000 to the consumers of water in the metropolis. The committee gave instructions to the gentlemen who framed the counter regulations to take an impartial view of the matter. On the one hand they were to protect the company against waste, and at the same time to protect the consumers against vexatious and annoying requirements. He would refer to a few of the regulations in which the committee were of opinion some alteration should be made. They had made some alteration as regarded the weight of the lead pipes to be used for the conveyance of the water supplied by the company, thinking that it was not necessary that it should be of such a weight per lineal yard as that proposed. The committee recommended that pipe of half an inch internal diameter should be 6 lbs. per lineal yard, as against 7 lbs. in the company's regulations, and that 1¼ inch pipe should be 16 lbs. to the lineal yard, instead of 22½ lbs. as required by the water companies, and so on for intermediate sizes. This modification was proposed on the experience of Manchester. In No. 13 of the companies regulations they would find that the branch pipe to convey water directly from the pipes of the company (without the intervention of a cistern) for the special purposes of drinking and cooking must be laid from a "screw-down" stop valve of a kind approved by the company, and then under regulation 17 it was laid down that every cistern should be made of sufficient capacity for holding the quantity of water likely to be required from it in the course of one day of 24 hours. That would be all very well for first and second class houses, where there was space for a cistern; but if they were to compel small houses to have a cistern capable of holding 24 hours consumption, they would practically deny them the opportunity of having a constant supply. By the 31st regulation all ferrules, stop-valves, ball-taps, draw-taps, and apparatus used in connexion with the supply of water from the company should be of the kind approved by the company. So that whatever they chose to submit as their standard would have to be rigidly adhered to. That was giving the companies immense power, and the committee recommended that all these articles should be similar in substance, and quality of material and make, to samples provided by the company, and approved by the Board of Trade at the time of their confirmation of their regulations, or to samples which might hereafter be approved by the Board of Trade, after hearing the Metropolitan Board authority; and that such samples should be kept at the office of the Board of Trade, and should be referred to as decisive in any dispute that might arise as to the size, substance, description, or quality of the fittings prescribed by these regulations. Then the committee in another regulation, provided that, except with the written consent of the consumer, no cock, ferrule, joint, union, valve, or other fitting, in the course of any communication-pipe, should have a water way of less area than that of the communication-pipe. The most important point of all was regulation No. 31. The conditions laid it down that no person could have a supply of water unless he conformed to their regulations; but the committee had qualified this by providing that no person should be compelled to take up his pipes or fittings unless it could be proved that they caused a waste, fouling, or misuser of water supplied by the company. Mr. Dalton concluded by moving a resolution to the effect that the amended regulations for a constant supply of water now laid before the board be approved, and that they be proposed to the Board of Trade, in substitution of the regulations made by the water companies.

Mr. RICHARDSON seconded the motion, and called attention to one or two of the regulations which would affect the present consumers of water, and not those who would become so in the future. All the regulations proposed did not have an *ex post facto* application, but some of them did, and those were well worthy of consideration. No 13 was to the effect that every communication-pipe for the conveyance of water into any premises should have, at or near its point of entrance into such premises, and within such premises, a screw-down stop valve, with an area of water way not less than that of an half-inch pipe, and not greater than that of the communication-pipe, the size of the valve within these limits being at the option of the consumer. That amounted to this—that if they had not got a stop-valve outside their premises it was imperative that they should have one; and if they did not do so they would have a difficulty in repairing the pipe without shutting off the water at the mains. Then the companies were very particular about the overflow-pipes, and said that no overflow or waste pipe, other than a "warning-pipe," should be made or attached to any cistern supplied with water by the company, and every overflow or waste pipe attached to such cistern should be removed or converted into a "warning-pipe" to the satisfaction of the company within two calendar months after the company should have given to the occupier a notice in writing requiring such waste-pipe to be removed or converted into a "warning-pipe." That was to adopt a pipe which would take the overflow from the cistern in such a way as that it could be seen. If they had no waste on their premises the company could not touch them. The committee had gone through the matter very carefully, and had made a few verbal alterations, and he had the greatest confidence in the wisdom of the course they had pursued.

Mr. NEWTON thought this was perhaps one of the most important questions the board had had to consider for a long time, and the matter was now in such a position as to enable them to judge of the correctness of the step they took at the end of the last session as to the regulations of the Metropolis Water Bill. There was a time in the legislation upon this question when the board were in

favour of the bill; but when it was altered so as to throw the framing of the regulations into the hands of the water companies, the board lost confidence in its action, and opposed its further progress; and they had now arrived at a stage which showed they were justified in adopting the course they did. If the regulations which the companies had prepared were to pass in their integrity as sent to the board, there was no doubt that they would entail upon the metropolis such a cost as it would not willingly bear, and would prevent a constant supply being provided for the public. He believed the companies regulations, if carried out, would put the metropolis to an expense of more than £2,000,000 at once, and that this expenditure would have to be incurred before the companies would be bound to give a constant supply. By the second clause of their regulations, they not only proposed that all the buildings that might be erected should have fittings of a certain quality, but that all buildings at present erected should alter their fittings to such as they had prescribed. It appeared to him that there were a few definite and distinct principles in these regulations which the board should observe. The first was as to whether they agreed that the regulations should have a retrospective effect; the second was whether they should insist upon a constant supply being such a constant supply as would be of service without the use of reservoirs as storeage; and the third was whether the fittings should be entirely under the dictation of the companies themselves, or whether they should be regulated by some impartial authorities. Now, as he had said, there were many clauses which were retrospective, but mainly the second, and that was one which would entail a very large cost upon the inhabitants. That clause provided that "no pipe shall be laid, used, or fixed," the word "used" evidently having a restrospective bearing. If it had said that "no pipe should be laid or fixed," omitting the word "used," its meaning would be only prospective, and there might not have been the same objection to it. The committees further defined the fittings which were to be employed. They laid it down that a half-inch pipe was to be 7 lbs. weight per lineal yard, but in the district which he represented the pipe which had been used by builders and sanctioned by the water company was about 4½ lbs. to the lineal yard. If 7 lbs. weight per lineal yard were now to be the substance allowed, it would involve the necessity of every yard of the piping which had been laid down under the sanction of the company being taken up and replaced by piping of a heavier weight. If that were so, the immediate cost would be at least £2,000,000. That would be a great hardship and annoyance, such as this board could never sanction. So long as that clause was not retrospective, but referred only to buildings to be erected, there was no great reason to complain; but there would be serious grounds of complaint if they imposed upon the existing buildings an alteration of their fittings in the way prescribed. There were ten clauses of the amended regulations which were retrospective, and these were referred to in the committee's 31st amended section. It was proposed that all these clauses should refer only to new buildings, and he sincerely hoped the Board of Trade would see the great necessity of allowing this alteration. The board wished to prevent the companies from frivolously calling upon the owners of property to make alterations in their water fittings unless they were absolutely faulty, and such as would lead to waste of water under the constant supply. Another question, which was probably the most important of the whole, was as to whether the metropolis was to have a constant supply, which could be properly so called, or merely a supply under the regulations of the companies, which, he contended, would not be a constant supply. Through the ferrule the companies would use for a constant supply, it would take 15 minutes to fill a 2-gallon pail, and nobody would venture to say that that was a constant supply within the meaning of the term. Indeed, that would be like "keeping the word of promise to the ear and breaking it to the hope." In the case of a poor laundress, who was using water by the pailful during the washing-day, it could not be said she would have a constant supply of water when it took 15 minutes to fill a 2-gallon pail, when it would take 11 minutes to flush a water-closet, and hours to fill a bath sufficient for any person to use, could that be called a constant supply? And yet that was the supply the companies, by their regulations proposed to give. The consequence was, that however small or poor the house, every one would require to have a storeage of water, and he thought the Act of Parliament had been passed to prevent the necessity for that. He remembered that the evidence given upon the subject was that poor people, who in many places lived at the top of houses, in garrets, were compelled to take up water in the morning, and it was placed under the bed or in some spot where it became almost fœtid and unfit for human consumption, and the Legislature had come to the relief of those people by compelling the companies to give a constant supply. The more wealthy people in larger houses could take care of themselves, by having cisterns and the best of fittings, so that they could use water precisely as they wanted it. The amended regulations of the committee provided that there should be no ferrule in the sense in which it was used by the companies. He entertained a strong opinion that the Board of Trade ought to be reminded that the fittings should be of the simplest kind, because he knew from experience how annoying the companies officers often were when they were dealing with those who were fitting up their houses, and he advocated that some authority should be appointed to decide between contending parties and to protect those engaged in building operations if the companies sought to be at all oppressive. Generally speaking, he thought the amended regulations were admirable, and he felt sure the board would enforce them before the Board of Trade with much effect.

Mr. RUNTZ called attention to what he considered a strange omission in connexion with this subject. He had not a word to say against the Parliamentary Committee, of which he was a member; in fact, he agreed with their recommendations; but it seemed very strange to him that while the board had an engineer—an eminent hydraulic engineer—in their service they had never consulted him upon these regulations. Inasmuch as their engineer was always called in to advise in cases of dispute out of doors, and would be called upon to give evidence before the Parliamentary Committee about these very regulations, he (Mr. Runtz) thought these regulations ought to be further considered, so that their engineer might have an opportunity of becoming acquainted with the different alterations which were proposed.

After some further conversation, the report of the committee was unanimously adopted, and they were authorized to make the necessary arrangements to support the amended regulations before the Board of Trade.

THE GAS SUPPLY IN COLCHESTER.

At the Monthly Meeting of the Colchester Town and Channel Improvement Commissioners, held at the Town-Hall on Monday, May 6, Mr. WOLTON, as Chairman of the Gas Committee of the Board, read the following report:—

To the Town and Channel Commissioners.

The Gas Committee have much pleasure in bearing their testimony to the great improvement which has taken place in the quality of gas supplied to the town for some weeks past, and they feel assured that the directors of the gas company have been, and are still, using their best exertions to render the gas what it ought to be, and what the public are entitled to receive. As the results of these efforts are so satisfactory, the committee recommend that at present no further action should be taken to obtain the proposed testing apparatus, and hope the continued excellence of the gas will justify their wish to spare the town the expense of this outlay.

The lighting and condition of the street lamps will in future be under systematic police inspection, which, although called in question at the last meeting, is now found to be specially provided for in the police regulations; and the desirability of this has been confirmed by the practice of other boroughs, it having been ascertained that in fifteen towns out of twenty who have been applied to, the police are accustomed to perform these duties.

The committee are desirous of making public the opinion received from an eminent counsel upon the point as to whether the company are obliged to supply gas of the quality stipulated in the Gas Act to the houses of consumers, or *only* within a certain distance from the works. This opinion most conclusively confirms the view entertained by the committee that the public are fully entitled to have 14-candle gas supplied in all parts of the town, and they have reason to believe that the company are prepared to recognize this construction and to give it practical effect.

HENRY WOLTON.
CHARLES F. FENTON.
A. KERSHAW FRANCIS.

Colchester, May 4, 1872.

Mr. Wolton said the committee were exceedingly pleased to find that they could conscientiously and truthfully render that report. At the last meeting he stated unhesitatingly that the gas was greatly improved, and from what he had heard and seen down at the works, he had every reason to believe that it would still keep improving. The promises made by their excellent chairman, on behalf of the gas directors, had been fully carried out, and were most satisfactory. The duty that had been cast upon the committee was a very delicate and a very anxious one; they had endeavoured to discharge it in the least objectionable manner, and if during the proceedings that had taken place a single observation of a personal or offensive character had been spoken towards any member of that board, or of the gas directors, all he could say was, that they were very sorry, and wished now to retract it. He hoped that after this they should all meet at the board with the same unanimity they had been accustomed to do previously. He believed that eventually the gas directors would find they had very great reason to be thankful this question had been mooted—that they now looked through their own eyes, and would be induced to do so more and more—that they were resolved that the town and every consumer should have that quality of gas which was guaranteed on the one hand by Act of Parliament, and on the other by agreement with that board—and that everything would work in the future most amicably. He hoped the commissioners would give the committee credit for having done their best for them, and that the gas directors would feel that if they had in any way or by any means caused the slightest offence they were entitled to have it forgotten and forgiven. He had no ill-feeling towards any one. He hoped his friend Mr. Harvey might be spared for many years to preside over that board, and also over the gas directors, for either body would in the loss of him lose a most able and energetic man, one who always acted honestly and straightforwardly. It was in a wonderful degree owing to Mr. Harvey that this question had been so amicably settled, and he was delighted it had been. Might they all now be friends together.

Mr. FENTON, as a member of the committee, mentioned that last week he had occasion to come into Colchester by the mail train, and on a subsequent evening he walked from Lexden after the lamps had been lit. On both occasions he looked at every lamp as he passed, and from each of those districts to his own door he did not see a dirty lamp, and the gas was burning efficiently. In fact, he doubted whether any town in the kingdom was better lighted than Colchester on those two occasions. He did not think the stir that had been made as to the gas would prove more beneficial to the commissioners and the town at large than to the gas company in the long run. He quite agreed with all that Mr. Wolton had said. If hard words had been used, or if hard measures appeared to have been taken, he and his colleagues on the committee were sorry for them. As Mr. Wolton had said, the committee were placed in a difficult and delicate position, and it was not until they were driven into action that they took strict measures respecting it. Now all had been settled satisfactorily and amicably, and he hoped they would as before be good friends together.

Dr. BREE said he was sure the board would feel greatly indebted to Mr. Wolton and the other members of the Gas Committee for the trouble they had taken. The question was one that had involved personalities, because a man could not do his duty without being subject more or less to things of that kind, but it had been settled very amicably, and he for one, as he was quite certain all the members of the board, felt very deeply indebted to the committee. He moved that a vote of thanks to them be entered on the minutes.

The CLERK said that was done at the last meeting.

Mr. BARNES said he fully agreed in Dr. Bree's remarks, and, as Mr. Wolton and Mr. Fenton had said, if any little ill-feeling had existed between the parties, he trusted it would now be buried and forgotten. He was quite certain the committee had done the duty for which they were appointed satisfactorily, and he was glad to hear that the gas company were now doing what they should have done before to supply the town with sufficient gas of good quality.

Mr. MARRIAGE suggested that the report of the committee ought to be adopted, but the clerk said it would be sufficient to have it entered on the minutes.

Mr. WOLTON said when at the last meeting he proposed, and the chairman at the same time as strongly opposed, the police being inspectors of the lamps, he was not aware that under the ordinary police instructions it was already required of the police sergeants on duty to receive reports from the constables nightly and deliver them to the gas office. After that meeting, he wrote to ten towns to ascertain what was done there, and he found that, out of those ten, eight had always been under police supervision as regarded their lamps. He mentioned that fact to the chairman, who, with his usual straightforwardness, told him that he too had written to ten other towns, and out of those ten, seven had always been under police supervision, making together, out of 20 towns, 15 where the police had the superintendence of the lamps. Their duties would be to report each night, to be entered in a report-book, what lamps were lighted or not, whether the light was good or imperfect, whether the lamps were dirty or broken, and anything of that sort. Next morning the report-book would be sent down to the gas office in Queen Street, and if the reports were at once attended to, complaint would be removed and nothing more heard of it.

Mr. MARRIAGE bore testimony to the improvement in the gas and the satisfactory way in which the committee had performed their duties.

The CHAIRMAN wished to acknowledge the very fair and considerate way in which the committee had acted in producing their report, and he fully reciprocated, as he was sure the directors and shareholders of the gas company would, the kind expressions which had fallen from Mr. Wolton with so much feeling and good taste. He could only say that in any interview he had had with him he had always found Mr. Wolton ready and willing to act most fairly and straightforwardly and every way in a business-like manner. Having corroborated Mr. Wolton's remarks as to the results of correspondence with other towns with regard to police inspection of lamps, the chairman added that from the reports which he had received he found that the duties of the police in those towns as to reporting defects in the public lamps and the gas were so carried out that the gas companies had no cause to complain of the arbitrary and unfair use of power. With 15 examples out of 20 he felt quite sure they must have great weight with the commissioners, and he hoped that the reports that would be made from time to time by the head constable would meet with prompt attention. He felt very thankful that the report had been presented, and he was quite sure no one could join more heartily in thanking the gas committee than he did as a member of the board. He thanked Mr. Wolton and the other members of the gas committee; and he trusted that in future they would all be able to act cordially together and satisfactorily to the public. He had one other matter to mention. At the last meeting he was asked to see Mr. Catchpool with respect to his note of resignation. He had done so, and Mr. Catchpool felt, what other members, whether directors or merely shareholders of the gas company must have felt, the delicate situation they were placed in during the recent discussions at that board. He (the

chairman) must say for himself as well as for others connected wilh the gas company, that it would be unbearable to sit there and be open to suspicion. The board, however, by the manly and considerate part they had taken, had made them feel much more at their ease than otherwise they should have felt. There had not only been no expression of want of confidence, but there had been the actual expression of confidence in them, and under these circumstances they had sat there and endeavoured to do their duty. If those who were represented at that board showed the same confidence, Mr. Catchpool would very cheerfully return to his seat, and he (the chairman) said so on the part of all others who were connected with the gas company. He thought gentlemen present would see that that feeling was only consistent with the sense of self-respect and independence in the discharge of public duties.

Mr. FRANCIS said he did not think there would be a single dissentient voice to the expression of the utmost confidence in Mr. Catchpool, or to that of willingness and desire for him to continue amongst them. He hoped there would be such an expression of opinion given as would enable that gentleman to return to the board and long continue to be with them. He (Mr. Francis) was very glad that the gas question had come so far to a satisfactory issue, and he hoped that it would not in future be the cause of contention amongst them. He wished it to be known that the opinion of counsel mentioned in the report had been obtained by Mr. Wolton entirely at his own cost, and that he had obtained it without in any way committing his colleagues on the committee. He had performed a most invidious duty all through kindly and well, and it was only due to him that the circumstance should be known.

Mr. TURNER said he was quite sure the members of the board would not allow Mr. Wolton to be money out of pocket in bringing about this beneficial result to the town at large, and that it was the unanimous feeling of the board that Mr. Catchpool should continue his seat amongst them. They all knew him to have been a most valuable member of the board, and to have done his duty without fear, favour, or affection.

Mr. FENTON said that he had noticed, during the discussions on the gas question, another of the directors of the company, Mr. Coleman, had been absent from meetings of the board. He was quite sure the board would be most happy to see him back again.

The CHAIRMAN said that it might be taken for granted that any expense Mr. Wolton might have been put to in obtaining counsel's opinion would be returned to him by the board.

Mr. WOLTON: No such thought ever entered my mind, I can assure you.

The CHAIRMAN: No, I am sure of that; but it will be only an act of justice notwithstanding.

Mr. FRANCIS said he considered the counsel's opinion was the most useful information the committee had obtained in the whole matter.

The discussion then ceased.

LEEDS TOWN COUNCIL.

A Quarterly and Special Meeting of the Town Council was held on Wednesday, May 8—the MAYOR (Alderman Barran) presiding.

The TOWN-CLERK said the first questions before the council were by Mr. Councillor Jackson, with reference to the gas supplied by the corporation. Mr. Jackson asked the chairman of the Gas Committee if the attention of the committee had been called to the correspondence which had recently appeared in the newspapers, in which unfair charges were alleged to have been made to gas consumers, and that certain irregularities had been allowed; whether the charges and imputations so made were substantially correct; and, if so, whether any and what steps had been taken to secure the public against a repetition of such irregularities; and whether any officials concerned had been discharged or reprimanded? The town-clerk said he thought the question was too general to be answered in the council. It should point at some particular question rather than any indefinite charges contained in a newspaper correspondence, which might have extended over any length of time. He suggested that Mr. Jackson should state a specific irregularity, because he felt obliged to advise the chairman of the Gas Committee not to answer the question. It was too general.

Mr. W. L. JACKSON thought the question was exceedingly definite in character, and the charges, as stated in the correspondence in the newspapers, very much to the point. No doubt the letters had been noticed by the members of the council.

The MAYOR said the council could not go into what had appeared in all the correspondence. The question seemed to be a broad one, comprehending the working of the Gas Committee, and he thought if Mr. Jackson would take the matter before the committee, it would be satisfactorily answered.

The TOWN-CLERK said the charges in the correspondence were made anonymously. Great injury might be occasioned by this means to people who might be perfectly innocent, and it was hardly fair to the officials to pay attention to any anonymous allegation or inquiry respecting one of their number having been discharged or reprimanded.

Mr. JACKSON said he quite agreed with the Town-Clerk that it would be exceedingly unfair and indiscreet to bring forward a question upon an anonymous correspondence. Such was not the case, however, in this instance. A gentleman named Pyper wrote a letter to the newspapers bearing his signature, to the effect that the Gas Committee had charged him for more gas than he had consumed, and surely this was a definite charge. He was quite sure there was a feeling of very general dissatisfaction on the part of the public, and he thought it was exceedingly advisable, both for the credit of the corporation and the satisfaction of the public, that some statement or explanation should be made, and if the allegation were unfounded, that a denial should go forth from the committee.

The MAYOR thought Mr. Jackson had now stated a specific charge which might be answered.

Alderman OXLEY (chairman of the Gas Committee) said there was no doubt that many charges had been brought against the Gas Committee, but he wished most distinctly to state, in the first place, whether the charges were correct or otherwise, that the corporation, as a body, were not to blame, excepting so far as the general superintendence of their officials went. He wished to clear the corporation from any blame that might have been attached to them respecting the condition of the gas since the gas-works had come into their possession. The rules given to the officials in the time of the two companies had been, with very slight exceptions, followed since the gas-works became the property of the corporation. These rules had been applied in most cases, if not in all, and with regard to the complaints, the committee were prepared to justify the charge. With reference to the specific case of Mr. Pyper, he might state that it had been the practice not only of companies in Leeds, but in Bradford and in all places where large gas-works were erected, to charge for gas which had been consumed, although not registered on the face of the meter. It was a fact which was exhibited to the committee by a model meter brought before them that gas could be burnt without registration by the meter. The meters were so constructed, since the Act passed regulating their construction, that they registered, if registering at all, in favour of the consumer. It had been, and he trusted that it would continue to be the practice, where gas could be fairly shown to pass through the meter without indication or registration, to make an additional charge for gas so passing through. There had been no system of general average, however, as stated in the newspapers. He understood an average to be a medium between one extreme and another. They had added to the amount of consumption when they found that gas had been consumed without proper registration. Again, with regard to Mr. Pyper's case, he admitted at once that the officials, or at least the inspector connected with the registration, had been reprimanded, because, in making the charges, he did not comply with the rules with which he was furnished. The particular rule to which he alluded was as follows:—"In every case where there is a marked difference in the registration, whether less or more, as compared with its previous registration, inquiries must be made as to the reason, and remarks made in the inspector's book." The register on Mr. Pyper's meter was found, on comparison with the previous registration, to have failed in registering the amount of gas, and making a comparison with the previous year, they added 3000 feet; but this was done contrary to instructions by the inspector failing to communicate with Mr. Pyper. Mr. Pyper ought to have been told of any increase made upon his register; but after the increase had been placed on the register, it was wrongfully taken off by the inspector without communicating the fact to his superior officers. This was wrong, and he trusted that the remonstrance made against the proceeding would prevent a recurrence of it. They thought that on a certain date the register was making less way than it ought to have done, and they were justified in coming to that conclusion. Upon making a subsequent examination, they found that a largely increased quantity had passed through the meter, and therefore, unless the public were to suffer for the benefit of individuals, they were justified in making an addition to the charges where the registration was proved to be defective. The practice of making the addition, too, was not confined to Leeds. It was universal where there was a large consumption; and he contended that no right-minded person, when it could be clearly shown to him that he was not paying for all the gas he was consuming, could object to pay the additional charge. It might be that they would find some who would not be willingly convinced, objecting to pay the additional charge, but he repeated that no one could feel justified in burning gas when he was aware that he did so at the expense of the public. There was also a complaint in the *Mercury* to the effect that some one had been charged for 1000 cubic feet without any registration. It was a fact. Inquiries had been made as to whether the gas had been burnt as usual; it was found that the meter was defective, and from the information gained, the person was charged to the same extent as in a corresponding period. He refused to pay in the first instance, but ultimately promised to do so. He did not give names, but the circumstance only showed that the gas authorities were right in making the charge. They were not justified in allowing such instances to pass unnoticed; because, whilst the committee were ever ready to investigate whatever charge was brought against the management, at the same time they were bound to test the complaint and support their servants so long as they faithfully and diligently discharged their duties. At their last meeting the committee came to the conclusion that cards should be furnished for each meter, for the purpose of registering the quantity of gas. Whenever the man called to inspect the meter he would have to put a copy of the registration he entered in his book on the card which would be affixed to the meter, and in this way the consumer would be able at any time to see the state of his meter. Still, it was not every one who would even take the trouble to do this; but he hoped when new cards were circulated they would do so. He did not mean to say that the system would entirely do away with complaints, but he hoped and believed that it would tend to do so in some degree. The custom of using registration cards had been already employed by some of the largest consumers, and given the greatest satisfaction. Then a great deal had been said about the quality of the gas, and charges of supplying inferior quality preferred against the company. Only that morning a gentleman had remarked to him, "I don't know how it is, but really I am always sorry when the price of gas is reduced, because I always find that the lower the price to which it is reduced the higher is the amount charged. I really feel that it is no benefit to me to have it reduced." He (Alderman Oxley) was very much afraid that they could not furnish the gentleman with subject for sorrow for some time to come, because they would not be able to reduce the price of gas. He wished to state that the water-line in each meter was so arranged that the meter could not register more gas than it ought to do. It might register less, however; and therefore, when it was unable to register in favour of the committee or supplier of gas, it frequently registered in favour of the consumer. But, apart from the question of measurement by the meter, gas bills might be increased in a variety of ways. Consumers might have bad fittings, leakages, and escapes; and probably all the taps might not be fully turned off in the evening. Small escapes would add considerably to the amount at the end of the year. These were among the reasons for the complaints against gas bills being increased. Certainly there was no reason for the bills being higher; the committee only charged for that which was registered as consumed, with the exception of a small per centage. Complaints were made about the smokiness of the gas; and amongst the number he remembered one by an alderman of the borough, who seemed half inclined to be angry because the gas smoked the glass. He (Alderman Oxley) then said that it was a mistake to suppose that gas was not good because it did so. Gas was not only as good, but was better when it smoked the glass. The very fact exhibited its quality. It was not difficult to give the reason why good gas, with a superior illuminating power, should, if not properly regulated, make smoke, because from what source did they obtain it? One gentleman wrote to him, designating the gas as at present supplied by the corporation in Leeds, "a vile compound." In its very vileness lay its safety; for how did they ascertain any leakage or escape but by the smell? They had been using more cannel coal than was previously used; and, in order to satisfy the committee as to the illuminating power of the gas, he had got a table supplied by one of the inspectors of gas-meters. They must remember, however, that the companies had no control over the tests made by this meter inspector, nor had the committee. The statement must, therefore, be taken with this explanation. The yearly returns of the quality of gas from 1866 to 1872 were, according to the statement, as follows:—1866—Average illuminating power of the old company. 17·17; ditto, new company, 17·45. 1867—Old, 16·39; new, 16·65. 1868—Old, 17·14; new, 16·79. 1869—Old, 16·58; new, 16·32. 1870—Old, 17·31; new, 16·42. 1871—Old, 17·19; new, 16·81. They now came to the last year, when the companies were combined with the corporation, and when the average was 18·29. The standard which the corporation was bound to supply was at the rate of 16 sperm candles, but during the past year they had been supplying gas of fully 2¼ candles more than the standard of gas actually required of them. He had only to repeat that whilst the committee was ready at any time to investigate every charge preferred against the management, at the same time its members were bound to support their servants when they discharged their duties faithfully and diligently.

Mr. IREDALE was about to address the council, when

The MAYOR said that no discussion could take place without notice having been given.

The matter then dropped.

HEREFORD TOWN COUNCIL.

THE GAS-WORKS PURCHASE.

The Quarterly Meeting of this body was held in the Council Chamber on Tuesday last—the MAYOR in the chair.

REPORT OF THE SPECIAL GAS COMMITTEE.

Gentlemen,—Your committee have received a report from Mr. Davis, the manager of the gas company, as to certain works required to be done, and recommend that he be directed to carry out the same upon the understanding that the expense thereof shall be paid by the council in addition to the purchase-money. This report is annexed hereto.

We beg to report that the arbitrators respectively appointed by the council and the gas company for fixing the amount to be paid as the purchase-money of the works having failed to agree, the duties of fixing the same devolved upon the umpire, Mr. Cawley, who, on the 25th of April, made his award, by which he found that the sum to be paid by the council to the gas company should be £51,665.

For the purpose of taking up this award we have paid the sum of £319 10s., being one-half of the fee of the arbitrators, umpire, and accountant, and of the costs of the award.

By the terms of the contract one-half of the purchase-money has to be paid on the 1st of July, and the residue on the 1st of January next. It will be for the council to say whether it will be better to pay the purchase-money as thus provided or to pay the whole on the 1st of July next, but in either case it will be necessary that power be at once given to your committee to negotiate the borrowing of the sum required to be paid.

Your committee point out that in addition to the purchase-money of £51,665 and the £319 10s., the expenses of the award, the council will have to provide a sum sufficient to pay the expense of the conveyance, the purchase-money of the stock-in-trade, a working capital, and the cost of the works before referred to, and they suggest that the total sum authorized to be borrowed should be £55,000.

The powers of this committee came to an end upon the making of the award, and we beg to suggest that authority should be given to us to complete the conveyance and transfer of the works.

We call attention to the fact that arrangements should be made at once for the employment of a manager of the works, and that an understanding must be come to with all the persons employed by the gas company whether their services will be continued by the council or not, as otherwise the council may, upon the transfer of the works, find themselves without a working staff, and they suggest that a committee be now appointed who may make these preliminary arrangements and assume the management of the works upon the transfer.

C. ANTHONY, Chairman.

REPORT OF MR. W. DAVIES, GAS MANAGER.

Gas-Works Office, April 30, 1872.

To the Mayor and Town Council of the City of Hereford.

Gentlemen,—In accordance with the request of the Special Gas Committee, at their meeting on the 20th inst., I respectfully send you the following report, viz:—

It is customary in well-managed works to make provision during the summer months, when a portion of the plant is standing idle, to do the necessary repairs, or make additions so as to be prepared for the supply of gas during the coming winter.

As these works are to pass into your hands on the 1st of July next, at which time the days will have begun to shorten, one-half of the time usually employed for these repairs or additions will have passed away. The principal work to be done upon these works this season consists of the taking down of four old settings of retorts, and erecting eight settings of six retorts each upon an improved principle.

The retort-house has been rebuilt and enlarged for the purpose of receiving these settings, together with six others that were erected last summer. When the whole are complete the carbonizing power will be equal to a maximum daily make of 330,000 cubic feet, or at least one-third more than the old retort-house was capable of producing. It will, therefore, not be necessary to enlarge this part of the plant for some years to come.

Contracts for the supply of the materials necessary for the erection of these eight settings were entered into by the gas company some months ago upon very favourable terms, the prices of all kinds of materials having very much increased since the contracts were made.

I was anxious to proceed with the work as early as possible, but as the cost will be between £700 and £800, my directors considered it advisable to take their arbitrator's opinion upon the matter. I therefore wrote him as follows, viz:—

"Dear Sir,—I am directed to ask your opinion and advice upon the following:—

"You are aware of the fact that it is my intention to pull down the stack of old retorts, and erect others upon an improved principle, similar to those you saw when at Hereford. I informed you that the materials were all ordered for the new retorts, and a portion delivered.

"It is most desirable (if not absolutely necessary) that the work should be proceeded with in May; but my directors are not willing to incur the cost of making the proposed alterations without some understanding that they will be repaid by the corporation for the money so expended.

"*If* this is understood by the arbitrators the company are quite willing that I should proceed with the work, and keep a just account of all moneys expended for labour and materials, otherwise they will allow the works to remain as they are, and hand them over in their present state on the 1st of July next.

"Will you kindly give me your opinions as to what course we should adopt in the matter?"

To this I received the following reply, viz:—

"Dear Sir,—In reply to your letter of the 30th ult. I beg to say that the arbitrators or umpire have no power to give any directions as to the alterations you propose in the old stack of retorts, and it would therefore be inexpedient in the company to carry out such alterations unless the corporation will agree to pay their cost, in addition to the sum that may be awarded for the works.

"If you have provided any materials for the purpose you will be entitled to be paid for them, as part of the stock to be valued on July 1, which would not be the case were you to use them for the proposed alterations.

"My advice is, therefore, to do nothing in the matter, unless the corporation authorize the alterations to be made, and agree to pay the whole of the cost.

(Signed) "THOMAS G. BARLOW."

Under these circumstances I therefore beg respectfully to suggest that steps should be taken as early as possible by your committee, with the object of carrying out the alterations I have alluded to.

I shall be happy to give all the information and assistance in my power.

I remain, gentlemen, your obedient servant,

WILLIAM DAVIS, Engineer and Manager.

Mr. SYMONDS: Is that increased charge, which has just been read, presumed to be included in the gross amount you think of raising?

Mr. JAMES: Yes.

Mr. ANTHONY said he had great pleasure in moving the adoption of the report. He might say that that pleasure would have been enhanced if the sum total of the award had been much less than it was; but nevertheless, large as the sum might be, he certainly believed—indeed he had been assured on competent authority—that the purchase was a valuable and a good one, that nothing more than a commercial value was being given by the city of Hereford for the gas-works. It was true that some 18 years ago, immediately after the passing of the Improvement Act of 1854, which empowered a voluntary sale and purchase on each side, the council might have purchased the gas-works for a considerably less sum than that which had now to be paid. The fault was not that of the gas company, but of the council; and he was glad to think it was no fault on his part as a member of the council. But from that time to the present the works had been increasing considerably; and although the sum of £51,000, which the council had to pay, might appear a very large one, they must recollect that having had an examination of the accounts by an accountant, and of the works by two valuers, and by an umpire, there could be no question as to the fact that the gas company had been for some years past reaping a profit of £3000 a year. Now, with those profits, with works of such magnitude, and so lucrative as they had been—although Mr. Shellard used to shake his head as to large profits when the gas company were pressed for a reduction in the price of gas—when, he said, he looked at these facts, he heartily congratulated the city upon at last possessing such a lucrative property. With regard to the sum of about £700, which had to be paid for valuation, he found that generally the purchasers paid the entire cost, and that it was rarely less than £1000; whereas here the council had to pay only half, about £350. He had long been of opinion that gas formed an essential branch of police; and that, like water and all other public necessities, it should be in the hands of public bodies. Wherever there had been purchases of gas-works by Town Councils or other public boards throughout the country—and he spoke upon good authority—there had not been one case in which a public body had repented of what it had done. The result had always been satisfactory, and the suggestions which had been often made, that public bodies could not manage gas-works satisfactorily, had been completely answered. He was speaking now with authority, and would read an extract from a pamphlet by Mr. Silverthorne, a civil engineer, on the transfer of gas-works to local authorities:—

There is no question that, wherever the management of the works has been carried on exclusively by a public body, it has never been found necessary to relinquish it, and these remarks are intended as a reply to those who persist in saying that companies can manage gas-works more economically than corporations.

Without going into the question of the prospective management of the works, he would say that the council would have no paid directors; but although the directors would not be paid, as he believed they were now, he hoped that Mr. Shellard would continue to give the corporation, of which he was a member, the benefit of his services gratuitously. Then as to the increased price of coal. If the cost of production had been more to the late proprietors of the gas-works, consequent on the increased price of coal, would they not have increased the price of gas? Most certainly they would. The public would have found that, instead of the price going down, it would have gone up; or perhaps they would have ceased to allow the 6d. which they had recently lopped off, and which they had given in a very clever way in the form of a discount on payment within a certain time. Looking at all the facts, he thought the council had a very hopeful future as to the gas-works. Let them look for a moment at the history of the water-works. The council were in a similar predicament in reference to those works, and had to borrow the whole of the capital. If, for the purpose of the gas-works, the council could borrow the required capital at 4 per cent. and extend the repayment over 50 years, he felt sure that they would have a most excellent purchase. He feared, however, that their term of repayment could not extend beyond 30 years; consequently the city must expect a little pressure for a few years, as they experienced in the first years of the water-works. But quite independently of these considerations, the corporation had destroyed a giant monopoly which had been in existence for 50 years—a monopoly which all confessed was not consistent with the spirit of the present day. The shareholders of the gas-works were most of them his personal friends, and he should be the last man to say anything against them. He congratulated the shareholders on the purchase which had been made, but they would not be such great gainers by it, having been receiving a profit of £3000 a year. But what had the shareholders been doing with those large profits? Why capitalizing. He was informed that one shareholder held £1000 in original stock, and he had received a limited dividend, while the surplus had been capitalized. Now that was perfectly fair, and it was only right that such person should have the extra value of his property. If a man had been investing a large sum of money in any branch of trade, he naturally expected to realize its fair value. He believed, as he had said before, that they had a great future before them. He had no idea that the city of Hereford would recede, but felt confident it would march forward, and that the gas-works would ultimately yield as much profit under the management of the council as they did at the present time. Nay, he felt that in a few years they would have a much larger income than at present, without increasing the price of gas. He congratulated the city on the purchase, inasmuch as the capital which had been expended had been very largely made out of profits. It had been said by Mr. James and Mr. Llanwarne that in the last ten years the council had spent about £7000 on the pavements of the city, and that there would not be much necessity for further expenditure under that head for some time to come. The same remark applied to the gas-works, for they had been renewed almost *in toto*. The greater portion of the public mains had been recently laid, the large gasometer was nearly new, and the retorts were laid down last summer; the council would therefore have almost new works, and would have little to spend upon them in the future for some time to come. Under good management—and he could not see why the council should not have good management—the time would come (though most of them present might then be under ground) when the profits arising from the gas-works, the water-works, and the markets would almost meet the expenditure that was now defrayed out of the rates. At all events, he felt so certain as to the future that he would say, in moving the adoption of the report, that he experienced a pleasure which he had scarcely ever felt before in seeing his name, as chirman of the committee, appended to this report. He concluded by moving—"That the report of the Special Gas Committee be approved and adopted, and that the members of that committee form a committee to carry out the terms and conditions of the deed of arbitration, and reference up to the time of the payment of the purchase money, and the transfer of the property of the gas company to the corporation, and for that purpose to present a memorial with the city seal affixed thereto to the Lords of the Treasury for power to raise the money, recommended by the report of the committee, and to negotiate for a loan of the amount which the Treasury may empower the corporation to borrow (either in one or more sum or sums) upon such terms as they may deem expedient."

Mr. RALPH, in seconding the resolution, said it was a great matter of congratulation that the council had destroyed the monopoly of the gas-works in the city of Hereford. He had heard there were rumours that the corporation had entailed upon the city very serious responsibility in purchasing the gas-works, because, without any benefit being derived, it would necessitate the imposition of additional taxes. He was sure that was an erroneous view, and that there would be no necessity for calling upon the citizens for one penny more taxes, nor upon the gas consumers to pay a single penny more in the price of gas. He had been particularly struck by a paragraph in a local newspaper; and it smelt so much of the "shop" that he would read it. It ran thus:—

THE PROPOSED PURCHASE OF THE GAS-WORKS.—The award has been made in the matter of the Hereford Gas-Works, for which the citizens are to pay £51,665! They are also to take to the company's moveable plant, tools, stock of coal, coke, and fittings, at a valuation, and raise £1000 or so to carry on the works. And all for what? To raise the price of gas in Hereford, where the taxes are already frightening people out of their houses.

Here (continued Mr. Ralph) the allusion to the way in which the "moveable plant, tools, stock of coal, coke, and fittings," would have to be taken to at a valuation looked very much like as if some one connected with the gas-works had inspired that paragraph. He could not help admiring the sympathy and consideration for the poor ratepayers of Hereford which was shown by the writer of this paragraph; nor could he help thinking, in reference to the sympathy for the consumers of gas in Hereford, that if that truly benevolent feeling had existed a few years ago, the company would not have been so selfish as to have pocketed—as it was said they had been doing—49 per cent. profit. He saw he had taken the council by surprise, and that Mr. James had pricked up his ears when he (Mr. Ralph) said the consumers would not have more to pay for gas. Mr. James was anxious to know how that was to be effected. Well, supposing the council borrowed £55,000 at 4½ per cent. for 30 years. The instalment to be repaid was £1833 6s. 8d., and the interest for the first year £2475, making a total of £4308 6s. 8d. But after the first year there would be a reduction in the amount of interest, because £1833 6s. 8d. of the capital would have been paid off. According to the report, the gas company had been realizing a profit of £3000 a year for the last three years, but the council had a right to assume that in the last of the three years the profits had been considerably more than in the first of those years, because consumers had been increasing rapidly. He had indeed been told that during the last nine months there had been as many as 50 new gas consumers in Hereford. Again, as Mr. Anthony had said, the price of coal would materially affect the cost of the production of gas; and no doubt it would do so to a considerable extent. But it was astonishing to see how great men of business, like the gas proprietors, knew how to treat a matter of that kind. What did they do? Why, if coal increased in price they raised the price of coke; and instead of the price of coke being 10s., as it had been, he believed it was now 13s. So that the extra price obtained for coke would go a great way towards meeting the extra cost of coal. Looking at all the facts, he calculated that there would be only a deficiency of £800 or £900 to be met in the first year. Mr. Anthony had said he very much regretted the council did not purchase the gas-works some 17 or 18 years ago, when they could have been bought at a much less sum than had now to be paid; but his (Mr. Ralph's) opinion was that the council did well not to purchase the gas-works at that time on account of the great extent of public works—the

water-works, sewerage, &c.—which they then had in hand. The council had to pay back yearly a thirtieth part of the borrowed money, and if they had then purchased the gas-works the ratepayers would have been saddled with too much at one time. He dared to say he should astonish the council when he told them how this £900 was to be made up. By the Hereford Improvement Act the corporation took power for the construction of the water-works, the cattle-market, and the purchase of the gas-works; and therefore if they had been realizing a profit upon any one of those properties, it was quite competent for them to apply those profits, or any portion of them, to the liquidation of any debt which might accrue on the other properties. Looking at the abstract of accounts, he found that in 1867 the receipts from the water-works were £2031 1s. 8d., and from the cattle-market £600, making a total of £2631 1s. 8d. The total payments, including interest of money in both cases, were £898. He was not taking into account the money which had been invested, because that would be a saving of money; but the items he had given left a profit of £1733 1s. 8d. In answer to a question, Mr. Ralph said this was the gross revenue. Then, coming to 1871, he found the receipts from the water-works to be £2554 19s. 10d., from the cattle-market £890—total, £3444 19s. 10d.; total payments, for interest and water mains, £680 9s., as against a profit of £1733 1s. 8d. in 1867. The council was thus deriving a profit of nearly £1000 a year more than it was four years ago; and it would be considerably larger this year, because the expenses would be diminished. Some persons might say that because they were deriving large profits from the water they ought to diminish the cost; but he (Mr. R.) did not see that, because he had been speaking entirely in reference to the improvement accounts. If it were necessary to raise money for the purpose of the gas-works, it would be raised upon property that would be liable to be rated to the improvements, and would go no further. He found from the accounts that in 1867 there was balance due to the treasurer of £1647 1s. 10d., whereas in 1871 there was a balance due from the treasurer of £2101 14s. 5d. As they had increased their funds in hand so much, it would naturally be supposed that they had been paying off their debt. Well, not only had they been doing that as much as at any other period, but now the amount standing to their credit was about £5000 more than it was in 1867. It might be asked, if they had done these things, whether they had been done by calling upon the ratepayers for larger rates? No; certainly not. In 1870 they had one rate of 1s. in the pound, whereas for some years they had had two rates. And as they only made one rate of 1s., it might have been supposed that they would have found the balance against them. But, no; with only one rate, they found they had nearly as large a balance as in the previous year. Again, it might be asked if they had been reducing their expenditure. Well, in 1870-71 they had expended upwards of £3000 in paving; and in the past ten years the expenditure under that head, all paid out of capital, without borrowing, had been nearly £7000. If these things had been done, and the accounts showed that they had been done, he maintained that the council would be able to carry on the gas-works without taxing the citizens to the extent of one penny.

Mr. Llanwarne: You have omitted the loss of £400 by the police in that period.

Mr. Ralph, continuing, said he had not done so, and he was surprised at the interruption, because he was speaking only of the improvement rate, and not of the borough rate, on which the police was charged. When, he said, they considered that during the period between £6000 and £7000 had been paid for pavements, and that they had been able to do with a 1s. rate instead of a 2s. one, he thought they could rest perfectly satisfied, and assure the gentlemen who had inspired the paragraph which he had read, for the purpose of frightening nervous people out of their houses, that gas would continue at the same price, and that there would not be additional taxation imposed to the extent of one penny. He believed they should soon be saving £3000 a year for the city, and that in fifteen years or so they would be in the happy position of having an income from the gas-works, the water-works, and the cattle-market sufficient to pay all their expenses without having recourse to rates.

Mr. Gwynne James said it was very well known that he was one of the small minority of the council who were unfavourable to the purchase of the gas-works; and the award which had been made had certainly not changed his opinion. Still, he did not object that those who had advocated the purchase should blow their trumpets of triumph. He only hoped that the anticipations would be realized; if so, he should be quite satisfied for them to have their jubilations. But he must say a word or two in reference to the extraordinary speech of Mr. Ralph. He did not know whether Mr. Ralph was joking or in earnest—it was very difficult to determine. But if Mr. Ralph really addressed them in serious terms, he could only regret that Mr Ralph should treat the council in such a manner as to suppose that so transparent and fallacious an argument could receive credence at their hands. He was not going to follow Mr. Ralph through his figures, because they were so very mysterious that he could not appreciate them. Mr. Ralph admitted that there must be a loss to the council of between £800 and £900 a year. He (Mr. James) was afraid it would be very much larger; but it was useless to attempt to say whether the loss would be smaller or larger. It was conceded that there must be a heavy loss, put at something like £1000 a year, for some years; but Mr. Ralph said that although a loss it was not a loss, because the council had money to pay it. Assuming that Mr. Ralph was correct, how could it be said that money derived from other sources, and which might be applied to the benefit of the citizens, would not be a loss if applied to meet the deficit on the gas-works?—(Mr. Ralph: It is not so.)—But if the council applied the water-works and the cattle-market profit to the gas-works loss, there must be loss, because that profit might be otherwise employed—viz., in the reduction of taxation.

Mr. Ralph: Tell us what reduction of taxation you would apply these profits to.

Mr. James: If you mean that we shall never have any more taxation, I will sit down and not say another word. That, said Mr. James, continuing, was really the position taken up by Mr. Ralph. Mr. Ralph's argument was that if a man got 10 per cent. by one investment, and lost 2 per cent. by another, the latter was not a loss, because it was covered by the former. That was very flattering, but to his (Mr. James's) mind it was one of the most transparent ideas he had ever heard in his life. He very much doubted, indeed, for it was submitted to the council with a good deal of laughter, whether Mr. Ralph believed it himself. He did not think Mr. Ralph did believe it, and he should be very much surprised to find that any gentleman at the board believed it.

Mr. Anthony said that if he bought property worth £50,000, and paid £2000 or any other sum per year for it, he did not lose that money, but simply invested it in capital. He was not, he must confess, quite so sanguine as Mr. Ralph, as he believed that for the first three or four years there would be some difficulty. Precisely the same argument was used against the water-works, for which the council had to borrow every farthing of the money; but year after year those works got into a better financial position, until now the city reaped a large revenue from them; and such, he was convinced, would be the case with the gas-works. He hoped that they should be able to borrow the £55,000 for 50 years, for he had no idea of the present generation being taxed too much for posterity. If they could not get the time extended to 50 years, they must, of course, take 30 years. With the security which the council could offer, he thought they should be able to borrow at 4 per cent.; and if they could do that, and get the time extended to 50 years, then, commercially, it would be one of the best speculations which the city had ever made. He was sorry that Mr. James had not coincided with those members of the council who had advocated the purchase of the gas-works; but he had no doubt that Mr. James would now co-operate with them, and that they should also have the co-operation of other business men at the board. But, taking another view, even if they had not made a cheap purchase, which he never expected they would do, it was the duty of the corporation to persevere and make the works profitable. For his own part, he was in the sere and yellow leaf of life, having just entered the 70th year of his age; nevertheless he was able and willing to go to work and to do everything he could to make the gas-works profitable and beneficial to the city.

Mr. Keay hoped it would not go forth to the public, upon the authority of Mr. James, that there would be a loss to the city by the purchase of the gas-works. He maintained that there could not possibly be a loss for a single year upon the purchase, but that there must be a profit.

The Mayor said he had always been an advocate for the purchase of the gas-works; but, although the amount of the valuation was above what he had put it at, he was neither dismayed nor discouraged. He had no doubt the council would do as they had done on previous occasions when improvements of the city were contemplated, and as long as he had health and had a seat at the council he should not shirk any responsibility. He contended, in spite of what Mr. James had foreshadowed, that there would be no loss to the city, particularly after the review of Mr. Ralph, in which to a great extent he agreed. His worship passed on to support the views of some previous speakers as to the opinion that the gas-works could be properly managed by the council, and then to refer to the great improvements which had been carried out in Bradford and Manchester from the profits derived from the gas-works. He did not see why the same thing might not be done here. There was no reason why there should be anything to fear as to the result. The valuation had been made on fair, honourable, business terms, and if the works were worth so much to a private company, surely they must be worth as much to a public body. His worship, in a few additional remarks, cordially approved the purchase, and concluded by expressing his conviction that, notwithstanding the present disadvantages resulting from the increased price of coal, of labour, and of iron, the purchase was one that would ultimately be of great advantage to the city.

The resolution was then put, and carried unanimously.

Mr. Garrold said he had a resolution to move, but before he did so the council must allow him to go into a few particulars to show how he thought the view which Mr. James took was very fallacious. The works would cost £55,000; interest upon that amount, at 4½ per cent., without deducting anything for income-tax, would be £2475. The profits derived from the works by the company in the last year were, as nearly as he could ascertain—and he saw the figures during the arbitration—£3400. The amount was within £100 either way; but he thought it was more than £3400. The difference between £3400 profit, and £2475 interest, represented a sum of £925. The fact of the council borrowing £50,000 permanently, and which must remain for some time as a charge on the works, did not come into the profit of £925; because the law said they should not do that, but, being a public body, should provide a certain sum year after year, so that in course of time the works should be entirely free and unfettered. Well, for that purpose the council would have to provide £1833 annually; but, notwithstanding that fact, the idea should not go forth to the public that the council had purchased a loss. As a commercial investment, or as a speculation if they liked, he maintained that, after paying a fair interest on capital, there was left a profit of £925. It could not be held that the £1833 was so much loss out of profits, because it was nothing of the sort. It was simply so much capital—so much going annually into the capital stock of the corporation, just the same as if the corporation each year invested £1833 in land, and brought it to the credit of the corporation funds. There was not the slightest difference. He thought Mr. Ralph had rather overdone it, because he had gone on a process which the council need not adopt, and which they had not hitherto adopted. It was not fair when it was said that the council would have to pay interest on the whole of the borrowed money the first year, and then a smaller sum in the next and each succeeding year, because it would, in his (Mr. G.'s) opinion, be much better that they should pay an equal proportion of interest every year. That, however, was a matter for the consideration of the committee. After some further remarks on this branch of the subject, to show the advantage of an equal sum being paid annually for interest, Mr. Garrold, dealing with an argument of Mr. James's, contended that it was perfectly fair and legitimate to take the profits of one part of public works and apply them to the deficit on another part. In his (Mr. Garrold's) opinion, there could be no more wholesome thing for a public body to do. Mr. Garrold then read his resolution, and, alluding to the fact that the council would have to take possession of the works on the 1st of July next, pointed out the necessity for the requisite arrangements being at once made. In concluding, he expressed his conviction that the purchase of the gas-works was the best step ever taken by the city of Hereford since it began its career of public improvements, and that they would not live many years before those who were now grumbling would say it was one of the wisest and happiest things ever done. The resolution was as follows:—"That the mayor, Aldermen Anthony and Carless, Councillors T. Davies, P. Ralph, T. Llanwarne, R. Cooke, R. Keay, and T. W. Garrold form a committee for the purpose of making the preliminary arrangements for the carrying on by the corporation (on and after the 1st of July next), of the business and works of the gas company, who shall have full power to carry out the recommendations of the manager, to engage and appoint a manager, and the other officials necessary for the proper conduct and management of the said business and works, and who shall be a committee of management of such business and works until another committee is appointed."

Mr. Symonds said he did not see that either of the resolutions referred to the matter of the new retorts.

The Mayor: That is in the report.

Mr. Anthony, in rising to second the resolution, said he would first express his regret at the absence of the name of Mr. James from the committee. Did Mr. James really object to act?

Mr. James: Oh, yes; you had better carry out your own policy.

Mr. Anthony, continuing, said he anticipated that if they did not at first get any profit, they would ultimately do so, but he thought they would get gas of a much better quality. He would read one or two extracts from the work to which he had before referred. He believed the quality of the gas at Hereford was scarcely of 14-candle illuminating power, and the extracts he should quote would show the difference that existed:—

The price of gas at Burnley is 3s. 6d. per 1000, the illuminating power is from 17 to 18 candles, and the public lamps cost at the rate of £2 4s. per annum, and the working expenses are not more than 9s. 9d. per ton. Sale of gas (1870), 78,252,000 cubic feet. The amount carried to balance of profit last year was £5187, raising the surplus account to something like £22,307 17s. 2d. Date of occupation, 1855.

The price at Beverley is 3s. 4d., the quality 15 candles, and the working expenses 12s. 11d. per ton. Production of gas (1870), 25,742,200 cubic feet. The charge for supplying 289 public lamps is only £500—viz., £1 15s. per lamp. Date of occupation, 1852.

The price at Rotherham, in consequence of the late transfer, has been reduced to 3s. and 3s. 3d., and the quality is 16 sperm candles. Date of occupation, 1871.

And so (continued Mr. Anthony) it had been in nearly every instance; nor could he see any reason why the citizens of Hereford could not do the same as their fellow-countrymen in different parts of England—in fact, the same as the shareholders of the gas company had done. It was a very great credit to them to know that they had made the works so valuable. He was quite certain, as Mr. Garrold and others had said, that gas-works should be in the hands of public bodies; and although he (Mr. A.) might not live to see the full advantage derived from the possession of the gas-works by the council, he was convinced that those advantages would ultimately be very great. In conclusion he again urged the importance of the illuminating power of the gas being improved.

Mr. SHELLARD, who was named as one of the committee in the resolution, as drawn up by Mr. Garrold, wished his name to be struck off. His conduct at that board for 20 years was, he said, a guarantee that he did not desire to shirk work; but he had a strong objection, on grounds which he should not like publicly to explain, to serve on the committee. It might seem almost cruel to dispel the illusion of Mr. Anthony as to obtaining greater illuminating power; but the explanation was a very simple one, as Mr. Anthony would soon have the opportunity of testing. It was this—that to get the illuminating power referred to, they must go to the north of England for coals; they could not get it from the coals of the South Wales district.

Mr. LLANWARNE, Mr. BODENHAM, and Mr. SYMONDS severally urged Mr. Shellard to act on the committee, but Mr. Shellard declined to do so. At the same time he offered to render the committee any assistance he could in making such arrangements as might be necessary for the council to enter into possession on the 1st of July. There was then some conversation, not requiring reproduction, in reference to the manager's letter on the subject of the retorts, in which Mr. Shellard explained the present position and the course it would be desirable to take.

Mr. RALPH proposed that Mr. Alderman Carless be appointed on the committee, as Mr. Shellard had declined to act, remarking that while Mr. Carless passed the gas-works perhaps almost every day, it was well known that there was no better man of business in the council. Mr. Ralph made a brief reply to the remarks of Mr. James, and maintained that his arguments were based on a sound principle. In the course of his remarks, Mr. Ralph touched upon some of the points which had been noticed in the discussion.

Another subject noticed had reference to the engagement of Mr. Walsh, the official reporter of the Oxford Circuit, being engaged to take notes instead of a local reporter; also, whether there was any necessity for notes being taken.

Mr. GARROLD explained that all the local reporters were at the assizes, and therefore Mr. Walsh was engaged. As to the necessity for taking notes, he was satisfied that the expense had been lessened rather than increased by the course adopted.

The MAYOR submitted the resolution to the meeting, and it was carried unanimously.

Mr. LLANWARNE stated that if any difficulty should arise as to the corporation raising the money to be paid on July 1st, the gas company would afford them every facility as to extension of time.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN APRIL, 1872:—

April, 1872.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas	16·86	17·40	16·40	32·44	9·78	30·53	0·63	None.
Chartered Company's common gas	16·73	17·40	16·50	40·52	18·23	35·74	0·18	None.
Chartered Company's cannel gas	23·80	26·10	23·00	34·17	14·70	27·55	0·51	None.

Mean of daily readings of barometer . . . 29·78
" " " thermometer . . . 60·61

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

During the month the illuminating power of the Imperial Company's gas ranged between 17·40 candles and 16·40, the mean for the month was equal to 16·86 candles. The mean quantity of sulphur in 100 cubic feet was 30·53 grains, and of ammonia 0·63 grain. The mean light of the Chartered common gas was equal so 16·73 candles; it ranged between 17·40 and 16·50 candles, the mean quantity of sulphur amounted to 35·74 grains, and of ammonia to only 0·18 grain. The mean light of the cannel gas was equal to 23·80 candles; it ranged between 26·10 and 23 candles, the mean quantity of sulphur found in it was 27·55 grains, and of ammonia 0·51 grain. As regards pressure, the gas of the Imperial Company continues very low in the early hours of the evening, and I often receive complaints respecting it; the pressure of the other gases was satisfactory. On no occasion was sulphuretted hydrogen detected in either of the gases. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas, manufactured at their works, Horseferry Road, Westminster.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN APRIL, 1872:—

April, 1872.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	April, 1871. 0°	April, 1872. 0°	April, 1871. 0°	April, 1872. 0°	0°
Distilled Water . . .					
West Middlesex water	19·04	19·84	0·80	0·76	·001
Grand Junction water	19·62	19·96	0·84	0·80	·002

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

On one occasion I observed in the water supplied by the West Middlesex Company a slight sediment of sand, which I think must be due to some accidental circumstance, for throughout the rest of the month it was perfectly bright and colourless. The water of the Grand Junction Company was slightly turbid on two or three occasions only, at other times it was perfectly clear and bright.

GAS SUPPLY OF HULL.—Mr. Baynes reports that the gas supplied to the district of Sculcoates and Myton by the British Gas Company during the month of April was of very uniform quality and satisfactory illuminating power. The extreme range was only half a candle. At no time was free ammonia or sulphuretted hydrogen present to the ordinary tests. The results for the month are:—

	Maximum.	Minimum.	Mean.
Illuminating power stand. sperm candles	15·09	14·63	14·87
Grains of sulphur per 100 feet	27·10	25·10	26·42
Grains of ammonia per 100 feet	—	—	1·00

Mean barometer and temperature in experiment-room: Bar., 29·96; temp., 56.

CHELTENHAM GAS BILL.—Negotiations are now in progress which will probably lead to the abandonment of further opposition to the bill of the gas company before Parliament. The company have already succeeded before the Lords, and a proposed compromise will avoid opposition by the commissioners in the Commons.

SHEERNESS PUBLIC LIGHTS.—At a meeting of the local board, on Thursday, May 9th, the clerk stated that when the month's contract with the gas company terminated he waited upon the secretary to the company, but that gentleman refused to sign another contract before the board had signed it, and the consequence was the town was in darkness for two nights. Captain Pennell had, however, become answerable for the lighting of the streets for a week, and he wished to remind the board that Captain Pennell's agreement with the company would expire that night. After some discussion, it was decided to contract with the company to supply the town for another month, and that a penalty of £10 should be inserted for the due performance of the contract. A cheque was also ordered to be drawn for lighting the streets during the past week.

THE NEW GAS GENERATOR COMPANY, LIMITED.—Our advertising columns contain the announcement of the formation of a company under the above title, with a capital of £250,000, for the purpose of acquiring and working the patents of Messrs. Porter and Lane, for improvements in the manufacture of gas. The capital is divided into 25,000 shares of £10 each, and the vendors take 8000 of these shares and a cash payment of £20,000 for the transference of their rights in the English patents. The foreign, Indian, and colonial rights are to be secured for the sum of £120,000. The prospectus describes the principle of the apparatus employed by the patentees, and points out the advantages to be derived from the invention. It is also stated that the improvements are about to be tried on a large manufacturing scale at the works of the South Metropolitan Gas Company, where the necessary alterations in the retort-branches are being carried out.

DEWSBURY TOWN COUNCIL—PROPOSED PURCHASE OF THE GAS-WORKS.—An important meeting of the Dewsbury Town Council was held yesterday afternoon, under the presidency of the mayor (Mr. Mark Newsome), at which a resolution passed by the General Purposes Committee, after conferring with a deputation from the Batley Town Council, in favour of the joint purchase by the two corporations of the works and plant of the Dewsbury and Batley Gas Company, at Batley Carr and Soothill, was considered and passed by the council. The General Purposes Committee, along with Alderman Day and Councillors Firth and Wooler, were appointed a committee to enter into negotiations with the company, and to settle the question as to which districts each corporation should supply with gas, and to report to a future meeting of the council.

PETERBOROUGH GAS COMPANY.—The half-yearly meeting of this company was held at the Angel Inn on Thursday last. The directors report stated that the revenue account showed a balance in favour of the shareholders of £2276 9s. 2d., and the profit and loss a balance of £2230 7s. 1½d. They, therefore, recommended a dividend to be paid at the rate of 8 per cent. The chairman congratulated the meeting on the favourable state of the position of the company, and said that owing to the economy and skill of their manager they had consumed less coal and got more gas from it than before; and, in reply to a shareholder, as to the probability of the consumers sharing in this prosperity by a reduction in the price of gas, he observed that the chances were quite the other way, coals having risen 50 per cent.; while iron and fire-clay as well as labour had all advanced. A long discussion followed, some of the out-of-town shareholders contending for the full right which the Act gives of realizing 10 per cent. before the question of reduction could be considered. One of the directors present thought that it was not a matter for the shareholders at that meeting to entertain; if consumers were dissatisfied they could call a meeting and state their opinions. The meeting generally did not view the matter in this light; but considered the discussion was calculated to do good, as the rise in price of materials and labour was a satisfactory reply to consumers looking for a reduction of price; indeed they might congratulate themselves there had been no rise in the price, the company having the power to increase the charge 6d. per 1000. The secretary stated that as soon as 10 per cent. was paid, and bonuses to make up that amount for past years deficiencies, it was compulsory on the company to reduce the price. A suggestion that the directors should receive some remuneration for their services was reserved for the consideration of the next annual meeting; it being suggested that the order of precedence should be 10 per cent. for shareholders; 2nd, remuneration for directors; and 3rd, reduction in the price of gas.

BRIGHTON GAS COMMITTEE.—The report of this committee, which was laid before the Town Council, on Thursday last, contains the following, and also a letter from Mr. Paddon, manager of the Brighton and Hove Gas Company, promising that steatite burners like those used by the Black Rock Company shall be supplied to the public lamps in the Hove Company's district:—

Report of the Illuminating Power and Purity of the Gas during the Month of April: *The Black Rock Company.*—Eight observations give an average value equal to 14·31 in standard candles. The highest observation was 14·64; the lowest, 14·22; the gas was free from sulphuretted hydrogen. Other sulphurous impurities existed in the proportion of 14 grains in 100 cubic feet of gas. *The Hove Gas Company.*—Eight observations give an average value equal to 14·24 in standard candles. The highest value was 14·52; the lowest 14·12. The gas was free from sulphuretted hydrogen. Other sulphurous impurities existed in the proportion of 21 grains in 100 cubic feet of gas.

The gas from both companies has in every instance during the testing exceeded the standard; the impurities are but moderate. (Signed) EDWARD MOORE,
Test-Office, Town Hall. Corporation Gas Analyst.

GAS EXPLOSION IN THE LEEDS CORN EXCHANGE.—On Tuesday morning, May 7, during the busiest part of the day's proceedings in the Leeds Corn Exchange, the merchants were startled by a loud explosion proceeding from the telegraph office in the building. The clerks in charge ran out in a state of great alarm; and before the assembly could understand what was the cause of the explosion, or the extent of the accident, a second explosion occurred. Upon this the merchants made for the street pell-mell. It was then observed that fire was running along under the balcony, where the large gas pipe was laid. The porter, fortunately, had sufficient presence of mind to turn off the gas at the meter, and all further damage was stopped. In the telegraph office the ceiling has been torn to pieces by the explosion, and the floor above in the Public Health department was lifted. Beyond this very little damage was done. How the gas escaped is not yet ascertained.—*Leeds Express.*

DREADFUL ACCIDENT AT THE TORQUAY GAS-WORKS.—At the Torquay Gas-Works, six men were dreadfully crushed on Friday, May 10. A space had been excavated on which to erect coal stores, and men were engaged laying the foundations, when, without warning, the end of the cutting, about 20 feet high, slipped away and buried three of the excavators. Their comrades dug them out and laid them down at some distance near the side, and were attending to their injuries, when the side fell in and again buried those three with three more, making six sufferers in all. The greatest consternation prevailed, and all available hands were soon busy at work and recovered the men alive, but mutilated to such an extent that it is feared four will die. These were removed to the Torbay Infirmary. Great credit is due to Mr. Greenfield, the manager, as well as to Mr. Mountstephens, the contractor, for the prompt and methodical manner in which the men were extricated and removed. The following are the names of the sufferers:—John Rowley, mason, of Paignton, both legs fractured, arm and hand badly cut, and bleeding from nose and ears, considered the most hopeless case; George Farley, of Maridon, one leg fractured, bone protruding, and the other thigh broken, also injured internally, dangerous case; John Colley, of St. Mary Church, very badly hurt; Carpenter, of Kingskerswell, also very badly hurt. These four, it is thought, cannot recover. Henry Mills of Paignton, and another, not much hurt, principally bruised legs, were removed to their homes. A public meeting was held at the town-hall, on Saturday afternoon, for the purpose of raising a fund for the relief of the injured men, and their wives and families. The chair was taken by the Rev. R. R. Wolfe, who explained the object for which the meeting had been called together. Mr. C. Luxmore stated that four men were in the Infirmary and one at his own home; two had wives but no family, and the others had

wives and four, six, and eight children respectively. Four of the men were in clubs. The purpose of the fund would be to assist the wives and children, and also to provide some means of procuring a subsistence for those men whose legs had been amputated. On the motion of Dr. Lombe, seconded by Mr. Hugh Erskine, it was resolved to form a fund; both gentlemen, on the presumption that public rumour was correct, emphatically condemned the want of care shown in the conduct of the excavating work which led to the accident. A committee was appointed, with Mr. Drower as hon. secretary, and a very liberal subscription list was made up in the room.

CLAIM FOR COMPENSATION AGAINST THE GLASGOW CORPORATION.—At the Dumbarton Sheriff's Court, on Thursday, May 9th, and following days, the case of *Stokes and Dixon v. the Corporation of Glasgow* was tried before Sheriff Blackburn and a special jury, the issue being the amount of compensation to be paid to the plaintiffs, who are the mineral tenants of the Garscube Coal-Field, for the minerals contained in 17 acres of the field which have been taken by the Corporation of Glasgow for the erection of new gas-works. By Act of Parliament the corporation were authorized to erect new gas-works near to Maryhill, and for that purpose they acquired 23 acres of ground. Of these 23 acres about six are occupied by the Dawsholm Print-Works. There are minerals under these six acres as under the whole of the 23; but these were reserved in the lease granted to the plaintiffs, and consequently the present trial referred to only 17 acres. The plaintiffs in 1866 obtained a 19 years lease of 300 acres of ground, of which the 17 in question form a portion; and in making preparations for working the field, they expended a capital of about £3000. In December last they were stopped working by the defendants, and the question to be decided by this trial was the amount of compensation to be awarded them on account of being deprived of the coal under these 17 acres. During the four days hearing, a large number of witnesses were examined, and the estimates were as usual in such cases extremely divergent. In the result the jury found a verdict for the plaintiffs for £2000.

BURSLEM BOARD OF HEALTH.—At the usual monthly meeting, held in the town hall on Wednesday, May 1, W. Woodall, Esq., in the chair, the Gas Committee made the following report:

The committee met on the 10th of April, and again on the 30th, to consider Dr. Odling's report and the question of the reappointment of Mr. Blackshaw as gas examiner. The committee have the greatest regard for all that Dr. Odling advances, but with reference to his remark on the necessity of forbearance towards the gas company they feel that the board have really been forbearing. The committee recommended that the board wait for the improvements pointed to by Dr. Odling, and hope that the gas company may be enabled thereby to remove all ground for complaint. The committee adopt the assertion of a recent writer on gas matters, who, remarking upon the transient purity obtained for some weeks, says that there is no reason why a purity so obtained should not be maintained for a longer period. The committee recommend that as this is a subject which very much concerns the health of the inhabitants, Mr. Blackshaw be reappointed gas examiner, at the salary of £25 per annum, with a grant of £10, to assist him in the purchase of a photometer; and that, for the purpose of testing for sulphur, the gas company be asked to provide for the examiner the apparatus known as the referees, so that the results may be accurately compared with those obtained in London.

The chairman of the committee (Mr. Shaw, also chairman of the gas company) remarked that the only matter which the gas referees, in their recent report, had definitively recommended as a means for reducing the sulphur in gas was an increase in the scrubbing and condensing power of the manufacturing apparatus; and he wished the board to know that he had already directed the manager to obtain the needful additional apparatus at the cost of about £500—showing that the directors were desirous to do all in their power to get rid of impurities and improve the quality of their gas. The gas examiner also forwarded a repert, which was as follows:—

I beg to annex particulars of the quality and purity of the gas supplied by the Burslem Gas Company during the month of April, 1872. Illuminating power, maximum, 15·01 candles; minimum, 13·34; average, 14·38. Sulphur, grains in 100 cubic feet, maximum, 40·26; minimum, 26·85; average, 33·60. During the last month the gas referees have issued their second report on the sulphur question. They recommended lime purification under a new arrangement, from which they expect very favourable results; also in their instructions to the London gas examiners they have fixed 30 grains as the maximum amount of sulphur to be allowed in the gas of the metropolitan companies after the 30th of September next. As the testing apparatus now used in London eliminates 22 per cent. more sulphur than Dr. Letheby's, this maximum amount of 30 grains represents about 24½ grains where the latter apparatus is used. I indulge the hope that the Burslem Gas Company will be able in a short time to reduce their maximum to that amount, and it may be to a much smaller one.

The report of the committee was adopted, and the suggestions contained therein ordered to be carried out.

EDINBURGH TOWN COUNCIL—LIABILITY OF THE WATER TRUSTEES.—At the meeting of the Edinburgh Town Council, on Tuesday, May 7, Mr. Gowans moved as follows:—

Seeing that the Town Council elected trustees to represent them, for the purpose, among other things, of providing an additional supply of water for the city, and seeing that the magistrates and council approved of their proceedings, the council now resolve to protect them from the consequences arising from their appealing against the decision of the Court of Session.

Baillie Marshall seconded the motion. Mr. Anderson moved, as an amendment, to strike out the last part of the motion, and, beginning with the word "resolve," add "to remit to the Lord Provost's Committee, to consider how the interests of the trustees can be protected against the consequences of the decision of the Court of Session." Ultimately the motion was withdrawn, and the amendment negatived.

WATER SUPPLY OF DONCASTER.—At the quarterly meeting of the Town Council, held on Thursday, May 8, the Mayor (Mr. W. C. Clark) presiding Alderman Hatfield moved, and Alderman Dunhill seconded, a resolution to the effect that as the committee of the House of Commons, in rejecting the Doncaster Water Bill, had expressed their opinion that steps ought to be taken by the corporation as soon as possible, to give the town a proper supply of water, the whole question be submitted to the special committee of the council who conducted the opposition to the bill, and that they advise the corporation, without delay, of the measures to be adopted to remove all complaint. This resolution was unanimously adopted.

Advertisements.

TURNER & ALLEN,

201, UPPER THAMES STREET,

London,

GAS & WATER ENGINEERS.

CONTRACTORS FOR THE SUPPLY OF

LAMP COLUMNS, LANTERNS, FOUNTAINS, PIPES, &c.,

TO

GAS, WATER, & RAILWAY COMPANIES, LOCAL BOARDS, SHIPPERS, &c.

Complete Pattern and Price Book, 3s. 6d. post free.

DUKE OF HAMILTON'S

LESMAHAGOW GAS COAL.

LESSEES:

LESMAHAGOW AND LONGLEE COAL COMPANY,

Office—5, DIXON STREET, GLASGOW.

Works—BLACKWOOD & SOUTHFIELD, LESMAHAGOW.

English and Foreign Agents:

JAMES MILLER, SON, & Co.,

1, GREAT ST. HELEN'S. LONDON, E.C.,

AND

75, UNION STREET, GLASGOW.

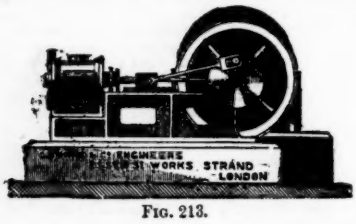


FIG. 213.

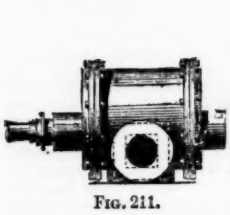


FIG. 211.

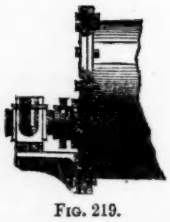


FIG. 219.

GWYNNE & COMPANY,

HYDRAULIC, MECHANICAL, & GAS ENGINEERS,

ESSEX STREET WORKS, STRAND,

London, W.C.,

SOLE MANUFACTURERS OF

BEALE'S IMPROVED PATENT GAS-EXHAUSTER,

Under the personal superintendence of Mr. BEALE.

REDUCED PRICES AND INCREASED CAPACITY.

Also manufacturers of Improved Hydraulic Regulators, to actuate a steam or gas throttle-valve to suit the make of gas; self-acting bye-pass valves, to move by hand or otherwise; improved stop-valves, with faced flanges, forming the neat adjunct to Exhauster of valve and elbow combined. Exhausters manufactured on the new principal have given the utmost satisfaction, and can be seen working at several large Gas-Works in London. G. & Co. are now engaged in manufacturing the largest Gas-Exhausters in the world, with engines complete.

The Gas-Exhausters may be made with inside or outside bearing, as shown in Figs. 211 and 219.

Fig. 213 shows the Improved Gas-Exhauster attached to, and driven by one of GWYNNE AND CO.'s well-known high-speed Horizontal Steam-Engines, without any intermediate gearing. This arrangement is extremely compact, and is beautifully adapted for small or large Gas-Works, and the foundations and erection are both very simple and inexpensive.

Prices and every information upon application to GWYNNE AND CO. *as above.*

C. & W. WALKER'S

WOOD SIEVES FOR PURIFIERS

Have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

Midland Iron-Works, Donnington, near Newport, Shropshire; 8, Finsbury Circus, London

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

The superior quality of this well-known Cannel, as wrought by

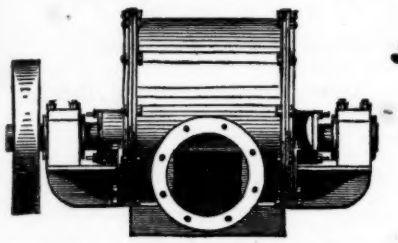
THE NITSHILL AND LESMAHAGOW COAL COMPANY,

Is now generally admitted by all Gas Engineers.

PRICE AND ANALYSIS MAY BE HAD ON APPLICATION TO

JAMES M'KELVIE, HAYMARKET, EDINBURGH.

BEALE'S GAS-EXHAUSTER IMPROVED.



FROM 250 TO 250,000 CUBIC FEET PER HOUR.

Since Mr. BEALE'S retirement, the Oldest Makers are

J. BURTON, SONS, AND WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS.
TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 inches to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever,
ROTATORY, TUMBLER, and CAPILLARY WATER DISTRIBUTORS for SCRUBBERS.
EXHAUSTERS from 3000 to 30,000 per hour in stock.

HOLLAND STREET, BLACKFRIARS, LONDON, S.E.,
Between Blackfriars' and Southwark Bridges, South Side.
A new Illustrated Catalogue sent on application.

ECONOMY IN GAS PURIFICATION. A PURER GAS AT LESS COST, AND GREAT SAVING IN LABOUR.

M'DOUGALLS' PRECIPITATED PEROXIDE OF IRON.

The above Oxide is now in use at some of the largest works in the kingdom, and has gained a decided preference, owing to its efficiency, cheapness, and the great saving in labour effected by its use.

It is a pure artificial Hydrated Peroxide, with an addition of only sufficient sawdust to give it the needful lightness or porosity to prevent pressure, and every particle is available for use.

In selecting an oxide, a point more important than its price, is to learn the cost of labour entailed in its use. Whilst at large works the cost of labour for purifying, where lime alone or the natural oxides are employed, is 2d. to 3d. per ton of coals, by the use of the above Oxide it is reduced to 1d. to 1½d., owing to the purifier's working so much longer when charged, and to rapid revivification—two points of special importance in the busy season.

For export to Foreign Works it is unequalled, every particle being available, and saves freight over less concentrated materials.

NOTE.—It is important to note that only the Hydrated Peroxide of Iron is useful, simple oxide being worthless. Inferior oxides show a large per centage of simple oxide, but very little Hydrated Peroxide.

M'DOUGALL BROTHERS,
LONDON—158, LEADENHALL STREET, E.C. MANCHESTER—68, PORT STREET.

FLETCHER AND MURPHY,

GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER;

Manufacturers of

IMPROVED CONSUMERS WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

LIVESEY FIRE-CLAY WORKS,
NEAR BLACKBURN, LANCASHIRE.
(ESTABLISHED 1835.)

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.
FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

As Trustees of the late ORLANDO BROTHERS, we most respectfully announce that we intend to continue the above business, under the name of ORLANDO BROTHERS, in which name all communications must be addressed.

We trnst that we shall receive a continuance of the same support which was given to our late father.

We are, yours most respectfully,

ORLANDO BROTHERS.
FRANCIS W. BROTHERS.
COLIN BROTHERS.

THE NEW GAS-GENERATOR COMPANY, LIMITED.

Registered under the Companies Acts, 1862 *and* 1867.

CAPITAL, £250,000, IN 25,000 SHARES OF £10 EACH,

Of which £80,000 in fully paid-up Shares will be taken by the Vendors. Upon the remaining 17,000 Shares, £2 per Share are payable on Application, £3 on Allotment, £2 on July 15, 1872, and £3 on October 15, 1872.

DIRECTORS.

The Right Honourable Lord ELIBANK, Darn Hall, Peebles, and Sunning Hill, Staines.
The Honourable ASHLEY PONSONBY (Director Submarine Telegraph Company), 9, Princes Gardens, Kensington.
P. E. BENDIR, Esq., 23, Old Broad Street, London.
JOHN IRVING, Esq., Mayor of Carlisle, and Deputy-Chairman, Carlisle and Silloth Bay Railway and Dock Company, Carlisle.
FREDERICK PORTER, Esq. (Messrs. Frederick Porter and Co.), 9, Mincing Lane, London.
Colonel E. SOUTHEY (late R.E.), Oriental Club, Hanover Square, and Kenton, Devon.

ENGINEERS—{ROBERT PORTER, Esq. / THOMAS LANE, Esq., C.E.} The Patentees, 25, Birchin Lane, London.

BANKERS—The IMPERIAL BANK, Lothbury, London.

BROKERS—Messrs. JACKS, HODGSON, & JACKS, Stock Exchange, and 4, Change Alley, London.

SOLICITOR—JOHN D. BLAKE, Esq., 3, Lothbury, London.

SECRETARY (*pro tem.*)—Mr. WM. MOORE.

Temporary Offices—25, BIRCHIN LANE, LONDON.

PROSPECTUS.

THIS Company is formed for the purpose of acquiring the valuable inventions of Messrs. Porter and Lane for improvements in the Manufacture of Gas, and in the apparatus connected therewith, and of working the Patents by the granting of licences for use of the same. Power has also been taken for the manufacture and sale of Gas Plant, and the erection of Gas-Works.

The English Patents for these inventions are now the property of the Gas-Generator Company, Limited, and are to be transferred to this Company in consideration of an allotment of 8000 fully paid-up shares, and a cash payment of £20,000.

The Patents and Patent Rights of Messrs. Porter and Lane for Foreign States, India, and the Colonies, are to be transferred to this Company for the sum of £120,000.

The immense improvements in the manufacture of Gas, and the great saving of cost which are effected by Messrs. Porter and Lane's inventions, are shown by the accompanying reports of George Livesey, Esq., Engineer to the South Metropolitan Gas Company; Robert Morton, Esq., Engineer to the London Gas Company; Henry E. Jones, Esq., Engineer to the Ratcliff Gas Company; G. W. Stevenson, Esq., C.E., F.G.S.; and by the accompanying note of the tests made by the gas-tester of the Phœnix Gas Company.

The principle of operation is the continuous passage of a thin layer of coal through a vertical retort in close contact with the whole of the inner surface thereof, leaving the interior space free for the evolution and passage of the Gas. This is accomplished by means of a screw of peculiar form, suspended on a central spindle throughout the whole length of the retort, which screw is driven by steam power, and feeds itself from a hopper on the top, at the same time discharging the exhausted coke into a receptacle below, whence it is removed by trucks, so that the coal is untouched by hand from first to last.

The advantages derived from this invention are—

1. *Great saving in outlay, space, fuel, and labour.*

Four-fifths of the retorts now used can be dispensed with under this system, owing to the rapidity with which the thin layers of coal are carbonized, and the utilization of the whole service of the retort.

2. *A large increase in the yield of Gas from each charge of coal.*

3. *The production of Gas of superior illuminating power, and almost entirely free from sulphur compounds, which now add so greatly to the cost and trouble of purification.*

A further advantage may be derived by making use of coal dust, which now lies at the pits mouths in vast quantities almost unsaleable.

To the above-stated merits of the system must be added, that it effects what has been long desired and anxiously sought for by all Gas Engineers—viz., *the continuous feeding and discharging of the retorts by a simple mechanism worked by steam power, instead of the exhausting and costly manual labour now necessary.*

The money value of the saving effected by the new system is estimated as follows:—

Per Ton of Coal Carbonized.	*s.*	*d.*
Saving upon outlay and space, say one bench instead of five (not yet ascertained) . .		
Ditto in fuel	1	0
(Present cost, two chaldrons at 7s.=14s. for carbonizing 7 tons of coal)—		
Saving in labour	0	9
(Present cost about 1s. per ton for stoking and wheeling)—		
Increased yield of Gas, 2000 feet, at 1s. 8d., the present cost into the gasholders . .	3	4
Per ton of Coal	5	1

which is equivalent to 8d. for every 1000 cubic feet of Gas produced.

The quantity of coal carbonized in London alone is stated to exceed annually 1¼ million of tons, whilst 10 millions of tons are estimated to be used for the rest of the United Kingdom. Adding to these figures 50 millions for foreign countries, India and the colonies, the saving which could be effected by the introduction of the new system, if universally adopted in the manufacture of Gas, would amount, according to the above estimate, to about £16,000,000 per annum during the term of the Patents.

It is evident that so important a reduction in the cost of the production of Gas must ensure the speedy adoption of the invention by all Gas Companies, and sets of large retorts of various sizes are already in course of construction (upon the principle and under the supervision of the Patentees) by the South Metropolitan Gas Company, and the Gas-Works for the town of Tenby are being remodelled entirely upon the new system.

An effort is being made to bring the retorts of the South Metropolitan Company into full operation for the inspection of the members of the Association of Gas Managers at their next annual meeting, and the Directors feel satisfied, from the favourable notice of the invention by the Metropolitan Companies, that the result of such inspection cannot fail to lead to immediate action on the part of the Gas Companies to secure the advantages of the new system, *the more so as the whole of the existing plant in all Gas-Works, except the retort-benches, will still be available without alteration.*

The following Agreements have been entered into on behalf of the Company—viz., An Agreement dated the 10th of May, 1872, made between the Gas-Generator Company, Limited, of the one part, and Francis Henry Moore, on behalf of the New Gas-Generator Company, Limited, of the other part; and also an Agreement dated the 10th day of May, 1872, made between Robert Porter and Thomas Lane of the one part, and the said Francis Henry Moore, on behalf of the New Gas-Generator Company, Limited, of the other part.

Copies of the Memorandum and Articles of Association may be seen on application at the Office of Mr. BLAKE, 3, Lothbury, LONDON, the Company's Solicitor.

Prospectuses, with Reports, and Forms of Application for Shares, may be obtained from the Brokers, Bankers, or at the Office of the Company.

Should no Allotment of Shares be made, the deposit will be returned in full.

Extracted from the Reports referred to in and issued with the Prospectus.

The Gas Tester of the PHŒNIX GAS-WORKS gives the following results of tests conducted throughout under his supervision, March 2, 1872:—

No. 1.—Coal used, Pelaw Main=28 lbs.
Time { Charge, 12.45 p.m. / Draw, 2.45 ,,
Make 150 cubic feet=12,000 per ton.
Illuminating power 15·06, Referees Burner.

Note.—Ordinary gas coal (as above) gives, by the present process, about—Gas, 9500 cubic feet; illuminating power, 14 candles; coke, 13 cwt.

No. 2—Coal used, Pelaw Main.....25¾ lbs. } =28 lbs.
,, Cannel (Lancash.) 2¼ ,, }
Time { Charge, 3.15 p.m. / Draw, 5.0 ,,
Make 172 cubic feet=13·760 per ton.
Illuminating power { 16·60 Referees Burner. / 15·00 Letheby's }

Note.—Ordinary coal with 8 per cent. Lancashire cannel added (as above) gives, by the present process, about 10,000 cubic feet, illuminating power 15-candles, coke 13 cwt.

The increase of yield according to the above tests is, therefore, greatly in excess of that mentioned in the prospectus.

ROBERT MORTON, Esq., Engineer to the London Gas Company, writes, March 9, 1872:—

"I was much pleased yesterday with the working of your Patent Screw Retort. It appears to me that you have at last overcome the mechanical difficulties which have hitherto baffled those who have attempted a continuous system of feeding and discharging. I believe we are all agreed that the proper way to carbonize coal is to have it spread in as thin a layer as possible against the heated surface of the retort, so that the gas may be extracted quickly, and pass off freely; and while it is impossible to do this with our present system, it is satisfactorily accomplished by your screw, which presents the coal in a continuous thin stream against the whole inner surface of the retort.

"I cannot help thinking your discovery is a very valuable one. Quantity of Pelaw Main coal used in each experiment, 28 lbs. The average of four experiments gave 10·680 cubic feet of 15·86 candles by Sugg's New London Burner, with 80 bushels of coke, weighing about 15½ cwt."

GEORGE LIVESEY, Esq., Engineer to the South Metropolitan Gas Company, says, March 12, 1872:—

"I think the results obtained show the system to be one capable of producing a quantity of gas per ton of coal, equal, if not superior, to that obtained by the best known means with at least as great an illuminating power; at the same time the manufacture is so completely under control, that both quantity and quality may be regulated with great nicety; a very good yield of 14 or 15 candle gas or a smaller quantity of richer or a larger quantity of poorer gas may be produced at will.

"I am not content with the application of the system on so small a scale, but think if retorts, say 18 inches diameter, 8 feet in the fire, were used, with a double-thread screw worked by machinery, adapting the principle, in fact, to the requirements of modern gas-making in large works, results would be obtained even better than those recorded. The South Metropolitan Gas Company is now ready, at its own expense, to carry out such a trial, which, if successful, will solve some of the most difficult and anxious questions now affecting gas companies. Steam power will be substituted for the exhausting labour of charging and drawing the retorts; the coal will be supplied in a continuous stream and exposed in a thin layer to the heated surface of the retort; this, being the condition most favourable to its carbonization, will give off the gas in a much shorter time, producing to some extent gas instead of tar. *The production of gas per foot of retort service is considerably greater than by the ordinary process*—the coke, though in bulk very much greater than by the common process, is very tender, but the use of the large retorts above mentioned will, I expect, render it somewhat harder, and provided it is hard enough to bear handling and carrriage without excessive waste, it will be admirably suited for domestic and other use.

"I anticipate also, from the rapidity with which the gas is evolved, and the shortness of time the coal is in the retort, the sulphur compounds will be less than is now the case."

H. E. JONES, Esq., A.I.C.E., the Engineer of the Ratcliff Gas-Works, says, March 15, 1872:—

"After a deliberate and careful examination of the working of your Patent Vertical Screw Retort, as adapted for the supply of a mansion or private consumer, I am able to say that it performs its duty in the most efficient manner.

"With a comparatively moderate heat it carbonizes continuously, regularly, and completely, giving far higher results than are usually obtained from apparatus on a similarly restricted scale.

"The gas is eliminated with extreme rapidity, and the illuminating power can be raised within certain limits at the will of the operator.

"There can be very little doubt that, with some variations of detail, the system is capable of adaptation on a larger scale to the works of public companies, where it promises to yield the best results in the carbonizing process, with a relative *economy of first cost, space occupied, and labour in manipulation.*

"For this purpose it possesses the eminent qualifications—first, capability of being actuated by steam power; second, continuous regular action; and third, complete utilization of the whole heating surface of the retort."

G. W. STEVENSON, Esq., C.E., F.G.S., says, April 29, 1872:—

"The retorts (which I am erecting at my own cost at my gas-works at Tenby, South Wales) are 7 inches diameter, and 4 feet 6 inches in the fire; and from trials already made, I shall doubtless obtain a minimum yield of 6000 feet of gas per retort in 24 hours. This is about 730 feet of gas to each superficial foot of surface in the retorts, whereas the best working on the present system of generating gas gives about 130 feet to each superficial foot of surface. In fact, I expect to get a production per retort *equal to nearly six to one in favour of your patented process* over the present system. There will be also a large saving effected in fuel, labour, and the cost of purification, and a larger quantity of gas of better quality will be realized from each ton of coal. *Nothing I could say in its favour would so fully express my opinion of its value as that which I have done and am doing with it.*"

HENRY SKOINES

Is prepared to undertake, by Contract or otherwise, the

SETTING OF EVERY DESCRIPTION OF

RETORTS, STEAM BOILERS, &c.,

With great economy of fuel and durability of workmanship.

GAS-WORKS LEASED OR REPAIRED BY YEARLY CONTRACT.

7, ARGYLE STREET, KING'S CROSS, W.C.

TO GAS MANAGERS.

WANTED, by the Newry Gas Consumers Company, Limited, Ireland, a WORKING MANAGER, at a salary of £120 a year, with residence, coal, and gaslight.

Applications in every case to be accompanied by testimonials, addressed to me, at the Office of the Company, not later than Thursday, the 16th of May inst.

GEORGE R. ARMSTRONG, Secretary.

Gas Offices, Newry, May 3, 1872.

COOKING AND HEATING BY GAS,

BY

MAGNUS OHREN, A.I.C.E.

NEW AND REVISED EDITION,

Prepared for Gas Companies to circulate amongst their gas consumers.

£1 per 100; £3 15s. per 500; or £6 per 1000.

Address, MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

TO GAS COMPANIES.

WANTED, by the Advertiser, a re-engagement as Manager of a provincial work, or as Assistant Manager or Foreman. Is well up in the making and distribution of gas in all its branches. First-class testimonials.

Address M. D., care of Mr. E. Sandell, Accountant, 4, Skinner's Place, Size Lane, LONDON, E.C.

WANTED, a Manager for the Goudhurst Gas Company, and to attend to mains, services, and meters. Wages £1 per week.

Apply by letter, stating age, qualifications, &c., to the SECRETARY, on or before the 31st inst.

Goudhurst, May 2, 1872.

COMMISSION.

WANTED, one or two good articles used at Gas-Works, to sell on COMMISSION, the Advertiser having a good connexion, especially in Lancashire and Yorkshire. First-class references can be given.

Address A 1, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a second-hand Station-Meter, by the Morley Gas Company, near Leeds, to register from 20,000 to 30,000 cubic feet of gas per hour.

Address, with full particulars, to WILLIAM WILSON, Secretary.

A Gas Engineer of middle age and considerable experience, having now completed an engagement, is desirous of an appointment to a work where the make would be 40 million or upwards.

Address ENGINEER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS.

SUPERINTENDENT WANTED for the Greenwich Station of the Phœnix Gas Company. He must be a thoroughly practical man, and capable of taking sole charge of the manufacturing works, machinery, main laying, and distribution.

Applications, setting forth experience had and when the duties can be undertaken, accompanied by testimonials of recent date, to be addressed to the Secretary, not later than the 27th inst., before 12 o'clock at noon. Selected candidates will be written to. The salary is £300 a year, with residence at the works.—By order,

I. A. CROOKENDEN, Secretary.

70, Bankside, S.E., May 16, 1872.

WANTED, by a young Man, a situation as Meter Fixer, Fitter, Index Taker, &c. No objection to go abroad,

Address Mr. J. ROWAN, 7, Castle Street, TUNBRIDGE WELLS.

WANTED, an appointment as Manager of Gas-Works. Thoroughly understands the manufacture and distribution of gas. Engaged at present as assistant in works where the annual make is 200,000,000 feet. References and testimonials on application.

Address L. M., care of John Bradley, 37, Moorgate Street LONDON, E.C.

WANTED, by a young Man, aged 28, a situation as Manager and Foreman of Gas-Fitters, or as Storekeeper and Inspector. Has a first-class experience of gas-fitting in all its branches; also meter inspecting, &c. First-class references as to character and ability.
Address A. B. C., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GENERAL CLERK Wanted in the offices of an Engineer. One accustomed to getting out drawings of Gas-Works preferred. Salary 30s. per week. References and security required.
Address letters to A. Z., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CLERK.

WANTED, a situation as Clerk. Nine years experience in factory accounts and shares. A knowledge of drawing. Good references.
Address J. S. M., 20, Mulgrave Place, WOOLWICH.

WANTED, a second-hand Gasholder and Cast-Iron Tank, about 30 or 40 feet diameter; also two PURIFIERS, having each an area of from 5 to 6 feet square.
Apply to the SECRETARY of the Gas Company, South Molton, DEVON, or to J. AND W. ROMANS, Engineers, 1, Walbrook, Mansion House, LONDON, and at 8, Forth Street, EDINBURGH.

TO GAS COMPANIES.

WANTED, by the Advertiser, a re- engagement as GENERAL FOREMAN of a Gas-Work. Is well up to his business, has the best of testimonials, and will give security if required.
Address B. W., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED immediately, for the Gas- Works, Woodstock, a GASHOLDER, with cast-iron tank, from 35 to 40 ft. by 12 ft.
Apply to the Secretary, Mr. E. HIORNS, WOODSTOCK.

FOR SALE, a cast-iron Tank for Gas- holder, 26 ft. diameter, 13 ft. 6 in. deep. The plates are in good condition. The Advertisers will undertake to deliver and fix it, or sell the plates as they are. A second-hand Gasholder, 63 ft. diameter, 20 feet deep. The Gasholder has been erected as a telescopic one, and there are sufficient plates to make the inner lift perfectly sound and good. The frame is very strong. The Advertisers would contract to erect it with new columns and girders at a moderate price.
Address, E. COCKEY and SONS, FROME SELWOOD.

FOR SALE, nearly new, Four Puri- fiers, 5 ft. by 5 ft. inside measure, 3 ft. 10 in. deep, with lifting apparatus and centre valve, 6-in. connexion.
Apply to Mr. W. BATES, Manager, Gas-Works, Worksop, NOTTS.

SECOND-HAND Station-Meter for sale, in excellent condition, passing 5009 feet per hour, with tell-tale clock, Three 6-in. valves and connexions, and iron stand.
Apply to W. and B. COWAN, Buccleuch Street Works, EDINBURGH.

FOR SALE, a set of Four Purifiers, nearly new, 4 feet square, with centre-valve, covers, and 6-in. connexions complete. Also Two Cup Valves.
May be seen (or particulars furnished) on application to the MANAGER, Gas-Works, LURGAN.

SECOND-HAND Apparatus for Sale. One horizontal Engine, 10-in. cylinder; Two vertical Engines, 9-in. cylinders; Three Beales Exhausters, with riggers and connexions complete, to pass 15,000 cubic feet, 25,000 cubic feet, and 40,000 cubic feet per hour respectively; sundry valves and connexions, and two Evans Photometers complete, all in good condition.
Apply to Mr. MORTON, London Gas-Works, Nine Elms, London, S.W.

FOR SALE, at the Sudbury Gas-Works, Five right hand, Five left hand Oval Mouthpieces, 15 in. by 11 in.; Seven with outlet in centre oval, 17 in. by 13 in.; Six 15-in. circular ditto; 25 3-in. H pipes, 27 in. centre to centre, one end spigot and one end socket.
Apply to the MANAGER.

HARTLEPOOL GAS AND WATER COMPANY.

FOR SALE, at the Gas-Works, West Hartlepool—
18 lengths of Circular Hydraulic Main, each 7 ft. by 15½ in. diameter, for Benches of 5 Retorts.
1 length of Circular Hydraulic Main, 15½ in. diameter, 7 ft. long, for Bench of 3 Retorts.
1 length for 5 Retorts, slightly damaged.
98 Bridge and Dip Pipes combined.
54 7½ ft. by 4½ in. by 3½ in. Ascension Pipes.
36 6 ft. by 4½ in. by 3½ in. Ascension Pipes.
60 Mouthpieces for 12-in. Circular Retorts.
About 130 12-in. Circular Retort Lids (cast iron).
About 200 Sight-hole Boxes and Plugs, various sizes.
1 Cast-Iron Damper, 3 ft. 3 in. by 1 ft. 8 in., with Chains, Pulleys, and Balance-weight complete.
1 Cast-Iron Damper and Frame, 5 ft. 6 in. by 3 ft. 3 in.
For particulars, apply to
THOMAS TREWHITT, Secretary.
West Hartlepool, May 11, 1872.

FOR SALE, a Vertical Condenser, con- sisting of 12 double rows of 6-in. Pipes, with Arch Pipes, Bottom Box 12 ft. 6 in. long, Tar Pipe and Dip Bucket, all in good condition.
For price and further particulars, apply to HENRY CRANMER, Manager, Gas-Works, STRATFORD-UPON-AVON.

FOR SALE, at the Gas-Works, Alton, Hants, two lengths of 12-inch D HYDRAULIC MAIN for beds of fives; one length of ditto for bed of three. 4-in. Dip Pipes, do. H Pipes; 4 in. by 5 in. Ascension Pipes, with saddle lockets for mouthpieces; 15-in. Round Mouthpieces, Lids and Screws; also one of Cockey's 5-in. Centre-Valves, for three Purifiers. The whole are being taken down for extensions, and can be bought at the above works at 4s. per cwt.
Apply to A. THOMAS, Manager.

FOR SALE, a Station-Meter in square case, 4 ft. 6 in. by 4 ft 6 in., by James Milne and Son, Edinburgh; also six oval Mouthpieces, 14 in. by 17 in.
Apply to G. T. MYERS, Manager, Gas-Works, Broughty Ferry, near DUNDEE.

FOR SALE.—To make room for exten- sions, the Barnstaple Gas Company have for DISPOSAL—
5 Lengths 14-in. Round Hydraulic Main.
2 Lengths 18-in. Round Hydraulic Main.
A small Station-Meter, with 4-in. connexions.
A Gasholder 35 ft. by 10 ft., at present in use, but must be removed by June.
The frame complete of another Gasholder, 35 ft. by 10 ft., ready for immediate delivery; together with several minor appliances suitable for small works.
For particulars, apply to W. C. RAPAREL, Manager.
Barnstaple, April, 1872.

THE BOLTON GAS COMPANY.

CONTRACTS FOR CANNEL AND COAL.

THE Directors of this Company are desi- rous of receiving TENDERS for
5000 Tons Mixed Cannel,
3000 ,, Cannel Nuts, and
5000 ,, Best Gas Coals or Nuts;
The whole to be delivered annually for a term of Two, Three, or Five years, in such monthly quantities as may be required by the Company's Engineer at the Bullfield or Craddock Lane Sidings of the Lancashire and Yorkshire Railway Company, or if carted, to be delivered at the Lum Street or Gas Street Works, except that the Cannel Nuts are to be delivered between the 1st of April and the 1st of October in each year.
The contracts to commence on the 1st of June this year.
The Cannel and Coal to be the best of their kind, and to be as free as possible from sulphur, bleed, refuse, and dirt, and to be well screened.
Sealed tenders, specifying the descriptions of Cannel or Coal, the pits at which they are to be raised, and the quantities proposed to be supplied, to be sent to the Gas Company's Offices, and directed to the undersigned, on or before Friday, the 24th of May next, at Ten a.m., stating also the cash terms for monthly payments.
The Directors do not bind themselves to accept the lowest or any Tender; but the person or persons whose Tender may be accepted will be required to execute an agreement prepared by the Company's Solicitors for the due performance thereof.—By order of the Directors.
HARRISON VEEVERS, Engineer.
Gas Offices, Bolton, May 3, 1872.

TO MANUFACTURING CHEMISTS AND TAR DISTILLERS.

THE Directors of the Ossett Gas Company are prepared to receive TENDERS for the Purchase of the TAR and AMMONIACAL LIQUOR to be produced at the Works, for One, Two, or Three years, from the 30th of June, 1872.
Sealed tenders, endorsed "Tender for Tar, &c.," to be sent not later than the 6th of June next.
The Directors do not bind themselves to accept the highest or any tender.—By order,
R. F. HAIGH, Clerk to the Company.
Gas Office, May 9, 1872.

TO GASHOLDER BUILDERS AND EXCAVATORS.

THE Undersigned is prepared to receive Plan and Specifications, with TENDER, for the erection of a GASHOLDER, 35 ft. by 14 ft., with 5 column guarders and guide rails, 6-in. inlet and outlet pipes, valves, &c. Also the excavating and puddling of a Gas-Tank, 41 ft. diameter and 15 ft. deep.
The lowest or any tender will not necessarily be accepted.
The unsuccessful plans will be returned.
Tenders will be received up to the 31st of May, 1872, by WM. SCOTT, Gas-Works, TOW LAW, DARLINGTON.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Western Gas- Light Company, Limited, are prepared to receive TENDERS for the purchase of the surplus TAR to be produced at their works, situate on the Grand Junction Canal, at Kensal Green, for the term of One or more years, as may be agreed upon, commencing on the 1st day of July next. The year's production to 31st of December last was 830,000 gallons. Security for the performance of the contract may be required.
Sealed tenders, addressed to the SECRETARY of the Company, and endorsed "Tenders for Gas Tar," must be delivered at this Office on or before Tuesday, the 28th inst.
The Directors do not bind themselves to accept the highest or any tender.
28, Argyll Street, Regent Street, London,
May 17, 1872.

HINCKLEY GASLIGHT AND COKE COMPANY, LIMITED.

THE Directors of the above Company are desirous of receiving TENDERS for the manufacture and erection of a new GASHOLDER, 60 ft. in diameter and 20 ft. deep, with columns, girders, and valves complete.
Also a set of four Purifiers, 10 ft. square, with centre-valve, covers, hoisting apparatus, &c.
Also Iron Roof for retort-house, 72 ft. by 37 ft., with ventilator the whole length.
Work to be completed by October next.
Drawings and specifications may be seen at the works, on application to the Manager, Mr. J. Surl.
The Directors do not bind themselves to accept the lowest or any tender.—By order,
WM. PRIDMARE, Secretary.
Hinckley, May 16, 1872.

TAR AND LIQUOR.

THE Directors of the Ratcliff Gaslight and Coke Company are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Works, New Crane, Wapping, London, E., for One year, from the 1st day of July, 1872.
All particulars may be obtained on application to the Engineer at the works.
Tenders, marked "Tender for Tar, &c.," must be sent to the Secretary on or before the 3rd day of June, 1872.
The Directors do not bind themselves to accept the highest or any tender.
345, Cable Street, London, E.,
May, 1872.

TO COAL AND CANNEL PROPRIETORS.

THE Directors of the Cheltenham Gas- light and Coke Company invite TENDERS for the supply of the best quality of CANNEL and COAL for making Gas in the district, affording the supply for One, Two, or Three Years, from the 1st of July next.
For quantities, particulars, and conditions of contract, application to be made to the Company's Engineer.
Sealed tenders, addressed to the Engineer, must be forwarded on or before Thursday, the 6th proximo.
R. O. PATERSON, Engineer.
Gas-Works, Cheltenham, May 9, 1872.

TO GASHOLDER MAKERS.

THE Romford Gas Company invite TENDERS, accompanied with plans and specifications, for the conversion of an existing single-lift GASHOLDER, 30 ft. diameter, into a TELESCOPE HOLDER. The general particulars of the work and the holder itself may be seen at the Works, Romford, Essex.
Tenders, &c., to be delivered on or before Friday, the 31st of May inst., addressed to the CHAIRMAN of the Romford Gas Company.
The Company do not bind themselves to accept the lowest or any tender.—By order,
JOSEPH LATCHFORD, Manager.
Romford, May 16, 1872.

BOROUGH OF SWANSEA.

TO CAPITALISTS, CONTRACTORS, AND OTHERS.

THE Swansea Local Board of Health are prepared to receive TENDERS for the supply of GAS for a term of not less than Ten years.
The Contractor or Lessee to provide and lay down, at his own expense, the necessary mains, and connect the same with the Lamp Pillars and Lamps of the Local Board.
No new Act of Parliament is required, as the Local Board, or their Contractor or Lessee, are already empowered by statute to break up the streets and lay the pipes, and, subject to the lighting of the streets or any of them, to supply private consumers, and recover the Gas Rents.
The population of the borough is 52,000.
For particulars and forms of tender, apply to Mr. Edward Cousins, Surveyor, Guildhall, Swansea.
Sealed tenders, marked "Gas Tender," to be delivered by post, addressed to "The Town-Clerk, Swansea," not later than Monday, the 8th day of July, 1872.
RICHARD AUBREY ESSERY, Town-Clerk, &c.
N.B.—The Corporation have land contiguous to the Docks, and at the lowest level, which might be treated for by any new Gas Company.
Guildhall, Swansea, May 13, 1872.

TO GASHOLDER MAKERS, MASONS, CONTRACTORS, &c.

THE Sowerby Bridge Local Board of Health are prepared to receive TENDERS for the construction of a 3-Lift GASHOLDER, about 79 feet diameter, also of a TANK 82 ft. diameter and 17 ft. deep.
The plans may be inspected at the Sowerby Bridge Gas-Works, or at the Office of Mr. P. Pons, 41, John Dalton Street, Manchester.
Tenders to be sent in, directed to the CHAIRMAN of the Gas Committee, Local Board of Health, Sowerby Bridge, on or before Monday, the 27th inst.
The Local Board do not bind themselves to accept the lowest or any tender.—By order,
CHARLES BARSTOW, Clerk to the Board.
Sowerby Bridge, May 2, 1872.

OSSETT GAS COMPANY.

CONTRACT FOR GAS COAL.

THE Directors of the Company invite TENDERS for the supply of about 3000 tons of good black well-screened GAS COAL, free from sulphur, to be delivered at the works from time to time in such quantities weekly as may be required by the Manager, between the 1st of July next and the 30th of June, 1873.
Tenders, endorsed "Tender for Coal," together with a few tons of Coal as a sample, to be sent not later than the 6th of June next to the undersigned, at the works, from whom further information may be had.—By order,
R. F. HAIGH, Clerk to the Company.
Gas Office, May 9, 1872.

COLCHESTER GAS COMPANY.

CONTRACT FOR GAS COALS.

THE Directors invite Tenders for the supply at per ton, during the Twelve months from this date, of 5500 tons of either of the following Gas Coals, viz:—
Washington Hutton.
Ravensworth Pelaw.
Pelaw Main.
West Leverson.
Edmondsley Hutton.
New Pelaw.
New Pelton.
The Coals must be delivered in the following proportions, and free of expense, afloat into lighters, at Wivenhoe, near Colchester:—

July, 1872	300 tons.
August, 1872	600 ,,
September, 1872	800 ,,
October, 1872	1000 ,,
November, 1872	800 ,,
December, 1872	800 ,,
January, 1873	600 ,,
February, 1873	400 ,,
March, 1873	200 ,,

The weight to be ascertained and verified in such manner as the Directors may from time to time order or approve.
Each tender must state the description of Coal proposed to be supplied.
Tenders to be delivered to the Chairman of the Colchester Gas Company, on or before Monday, the 10th of June next, and marked "Tender for Coals."
The Directors reserve the right to reject any tender.
J. B. HARVEY, Chairman.
Colchester, May 16, 1872.

CLAYTON'S PATENT SIX-WAY VALVE only requires one valve to work two purifiers; saves more than three-fourths of the connexion-pipes; requires neither tees, elbows, nor bends; no racks or springs to get out of order.
For particulars, apply to CLAYTON, SON, & Co., Gas Engineers, Hunslet, LEEDS.

CONTENTS.

	PAGE
Circular to Gas Companies:—	
Gas Agitation in Swansea	485
Advancing Price of Meters and Materials	485
Amalgamation of the Chartered and Western Gas Companies	485
Temporary Cessation of Manufacture at the Blackfriars Works	486
Reduction of the Sulphur in the Beckton Gas	486
Gas Agitation at Leeds	486
The New Gas-Generator Company	486
A Correspondence between the Corporation of London and the Board of Trade	486
A Gas Company in Japan	486
The Annual Meeting of the British Association of Gas Managers	486
Leading Article:—	
The Provisional Orders for 1872	486
Correspondence:—	
Patent Gas	487
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	487
Progress of Bills in the House of Commons	487
House of Commons Committee—Bolton Corporation Bill	487
Legal Intelligence:—	
Vice-Chancellor's Court—Clowes *v.* The Staffordshire Potteries Water-Works Company	490
Miscellaneous News:—	
Meeting of the Imperial Continental Gas Company	491
Meeting of the Bolton Gas Company	492
Meeting of the Staffordshire Potteries Water-Works Company	492
The Gas Question at Swansea	492
Major-General H. Y. D. Scott on a New Mode of Dealing with Sewage Precipitates	494
Weather Waste of Coal	499
Hong Kong and China Gas Company, Limited	500
Sale of the Site of Disused Gas-Works in the Metropolis	500
Tottenham and Edmonton Gaslight and Coke Company	500
Testimonial to Mr. James Young, of Stoke	500
The Purchase of the Ryde Gas-Works	500
Burslem and Tunstall Gas Company	500
Serious Accident at Salford	500
Dundee—A Family nearly Suffocated by Gas	500
Action for Damages caused by a Gas Explosion at Holloway	500
Gas Lighting in Buenos Ayres	500
West Lancashire Coal Trade	500
Purification of the River Don	500
Bath Water Supply	500
Bradford Water Supply	500
St. Helen's Water Supply	500
West Cowes (Isle of Wight) Water Supply	501
Haslingden and Rawtenstall Water-Works	501
Hull Water Supply	501
The Proposed Sewage Farm at Walton	501
Sewage Farms	501
Return by the Metropolitan Association of Medical Officers of Health of the Average Composition and Quality of the Metropolitan Waters, in May, 1872	505
Register of New Patents:—	
Somzé, M. L.—Joints for Water, Gas, and other Pipes	501
Hughes, E. T.—Regulating the Supply of Water, Gas, &c.	501
Lake, W. R.—Valves of Water-Meters	501
Davies, P. J.—Prevention of Damage by the Bursting of Water-Pipes in Times of Frost	501
Schmitz, E. N.—Gas-Engines	501
Walker, W. T.—Cleansing and Purifying Gas from Ammonia, &c.	502
Hildred, J.—Ventilating and Trapping Sewers	502
Wilson, M.—Sink Traps	502
Baker, J.—Water-Closets	502
Tibbitts and Fulwood—Paving for Streets, &c.	502
Skinner, R.—Artificial Stone	502
Whitwell, T.—Valves	502
Hollinshead, W.—Lighting Railway Carriages with Gas	502
Cole, F. C.—Hydraulic Machine	502
Franks, J. J.—Flushing Lavatories, &c.	502
Preston, F. P., Prestige, J. T., Preston, E. J., and Prestige, W. A.—Waste-Water Preventer Taps	502
Target, F. N.—Dry Closets and Commodes	503
Evans, F. J.—Purification of Gas	503
Brown, A. G.—Disinfecting Water-Closets	503
Gedge, W. E.—Joining of Bricks for Constructing Pipes	503
Vaughan, H.—Self-acting Escape-Valve	503
Irvine, A. R.—Mine-Lamps	503
Fenton, F.—Purification and Utilization of Sewage	503
Applications for Letters Patent	503
Grants of Provisional Protection	503
Invention protected for six months	504
Notices to Proceed	504
Patents which have become void	504
Share List of Metropolitan Gas Companies	504
Price Current	505

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 4, 1872.

Circular to Gas Companies.

An advance of 3d. per 1000 feet in the price of gas at Swansea has been made the occasion of no little agitation in that borough. As is usual under such circumstances, a considerable amount of ill-feeling has been engendered among consumers and local authorities, which has found its vent in reckless misstatement and unfounded charges against the gas company. The principal speaker, at a small indignation meeting held at Swansea, on May 29, was an excellent specimen of the agitator who comes to the surface when a gas company is to be attacked. Supplied with a few figures—some correct, some false—mostly the latter, however, he proceeds to draw inferences and make charges which have a telling effect on an audience no better informed or better disposed towards the company than himself. In this instance, the orator, taking as the basis of his calculation his own assertion that the company had been paying 4s. 6d. per ton for coals, endeavoured to show that at the price of 3s. 6d. per 1000 the manufacture of the gas had not only cost the Swansea Company nothing, but that they had been paid 1s. per 1000 for making it; in other words, that the company were selling for 3s. 6d. an article in the production of which they had already made a profit of a shilling. That this was his meaning is made clear by his next statement, that if the company paid a shilling a ton more for coal, or 5s. 6d., "the price of coke got from the coal would more than pay them." There must be something very exceptional in the state of things at Swansea if coke is worth more than coal there, and it is to be regretted that the speaker did not give us precise details of the value of this article. All his statements and inferences, however, fall to the ground before the fact that coal now costs the company 20s. per ton, and like a good many others at the present time, they do not find it easy to get it even at that price. The Local Board of Health of Swansea, as our readers may have seen by an advertisement in our last, have invited tenders for the erection of competing works and a supply of gas for ten years. He would be a bold, not to say a reckless speculator, who would, in the present state of affairs, make a contract to supply gas of good illuminating power to Swansea for ten years, except at a price which would probably astonish the members of the Board. And it is amusing to see that while the Board shrink from erecting works because of the advanced price of iron, and the consequent expense it would be to the ratepayers, they invite tenders from others to erect works and lay down mains, the increased cost of which must be paid by the ratepayers in the price of gas. But the shortsightedness and selfishness of local agitators was never more pronounced than in these proceedings in Swansea. They object to all extensions of mains because they may have the effect of keeping up the price of gas within a restricted area. They object even to the building of a good wall, and the laying down of a sound pavement. And while Swansea is not an inviting-looking place, and the unsightliness of their works is often made a charge against gas companies, the Swansea agitators actually blame the company for making their works substantial and respectable. The company, we believe, have nothing to fear from competing works. Whatever a new company can do they can do more cheaply, and the noisiest agitator at the meeting would no doubt be their customer if they supplied gas for a penny less than the new company. We have no expectation of seeing a new company at Swansea, and we may here point out that there are two obvious courses open to the Local Board: they might buy the Swansea Company's works at a fair price; or, if they actually believe that the advance in the price of gas is not warranted by the circumstances, they may take advantage of the provisions of the Gas-Works Clauses Act, 1847, expressly made for such cases, and have the financial condition of the company thoroughly investigated. Either of these courses would be much more sensible than that the Local Board have entered upon.

Here are a few more facts for the agitators for a cheap gas supply. A rise in the price of tin plates from 28s. to 50s. per box, and corresponding advances in wages, have compelled the meter manufacturers to raise their prices, and the gas-tube makers have done the same. Fire-clay retorts, also, which a year ago were quoted at 5s. and 5s. 6d. per foot, are now quoted at 7s. 6d. and 8s; and we add, shortly, that all other materials used in gas-making are advancing in proportion.

It is reported, on good authority, that the Chartered and Western Companies have agreed upon terms of amalgamation, but no details have yet transpired. The Western Company has held an altogether exceptional position, and possibly we may not be wrong in predicting that, when merged into the Chartered, the district will soon cease to be supplied exclusively with cannel gas. By their Act of 1870, the Chartered Company took power to discontinue the supply of cannel gas, on giving three months notice; and we shall see if any corresponding provision be introduced into the scheme of this amalgamation. The supply of limited areas of the metropolis with cannel gas is far from having a satisfactory effect, and we have no hesitation in saying that, to furnish the whole metropolitan district with gas as nearly as possible of the same illuminating power, would be decidedly

to the public advantage. Having regard to the position of the several districts, it is difficult to see how the district of the London Company north of the Thames can long escape being merged into the Chartered.

Gas has ceased to be made at the City of London works (Blackfriars) for the summer months, but the manufacture will be recommenced, we believe, on an increased scale in the coming winter.

Some changes in the mode of purification at Beckton have reduced the amount of sulphur in the gas made at that station to less than 20 grains per 100 feet, and sometimes, indeed, to less than half this quantity. This result, if it does not entail extravagant expense, and can be maintained, will be viewed with great satisfaction.

There are in some quarters erroneous impressions as to the consequences of the dismissal of the metropolitan gas referees. It seems to be supposed by some that when the referees go out of office there will be no more legal testing, and no longer any check on the gas companies. In reply to this, we may say that the Acts of Parliament under which the referees are appointed fix the illuminating power of the gas, and so far bind the companies; and, as regards impurities, the regulations made by the present referees will have all the force of law until modified or cancelled by any other referees who may be appointed.

That Corporations are not always able to please their customers in the management of their gas undertakings is now being abundantly proved at Leeds, where the dissatisfaction is great, and loudly expressed. The consumers complain that their gas bills are higher, and the gas worse than when they were supplied by the companies. The latter complaint can hardly be substantiated, and the former, no doubt, admits of explanation; but still great irritation is felt among the consumers, a large number of whom are disputing their accounts. They point with envy to the neighbouring city of York, where gas is supplied by a company to the satisfaction of everybody at the price of 2s. 6d. per 1000 feet.

The New Gas Generator Company does not promise to be a hopeful speculation. No sooner was the prospectus issued than the Phœnix Company hastened to disavow any participation in the experiments made at their works; and Mr. George Livesey, of the South Metropolitan Company, at once came forward to correct, not exactly misstatements, but misleading exaggerations in the same document. For "sets of large retorts of various sizes "already in course of construction by the South Metropolitan "Company," we have to read one set of six, of different sizes, two of each, purely for the purpose of experiments—a very different thing from the meaning clearly implied in the language of the prospectus. The shares, we see in the papers, are at 1 premium; but we have seen at a higher premium shares in a company brought out with nearly as much nominal capital, in which we are credibly informed the public subscribed for exactly 42 shares.

A long correspondence between the Corporation of London and the Board of Trade, relative to the sulphur contained in the gas supplied to the City, has just been published by direction of the Gas Committee of the Corporation. It opens with a letter addressed by the town-clerk to the Board of Trade on the 7th of December, 1869, and ends with another communication from the same official, dated March 21, 1872, once more reiterating the wish of the Corporation that the referees would fix a sulphur maximum. The correspondenee has lost much of its interest now that a sulphur maximum has been fixed, partly, no doubt, in consequence of the persistent requests of the Corporation of London.

The Yokohama and Tokio Gas Company is formed for the purpose of lighting the principal city and chief commercial town in Japan with gas. This is another proof of the eagerness with which this people are availing themselves of the applications of science, which have been until of late years confined to Europe and America.

The annual meeting of the British Association of Gas Managers will be held in London this year, and promises to be of at least average interest. Among the papers to be read, those which will be looked forward to with the most curiosity will, doubtless, be the one promised by Mr. Mellor, "On Dr. Eveleigh's System of "Manufacturing Gas;" and that by Mr. Jones, "On the Increased Price of Coal as Affecting Gas Companies." There are others, as our readers will see below, which deal with important practical subjects, and which, with the discussions thereon, will no doubt convey much valuable information to the members. The lecture this year will be by Dr. Odling, "On Sulphide of Carbon." The excursion will be to the new works of the Imperial Company in course of construction at Bromley, and to the works at Beckton, now in full operation. The following are the papers to be read not mentioned above:—"On the Various Methods of Collecting Gas "Accounts," by Mr. R. H. Jones; "On Governors and the Go-"vernor Room," by Mr. W. J. Warner; "On the Comparative "Cost of Purifying Gas by Lime and Oxide of Iron," by Mr. R. Fish; "On the Cheapest and Best Means of Abstracting Am-"monia," by Mr. Geo. Anderson; "On the Application of Cupro-"Ammonium," by Mr. E. Goddard;" "On the Hydraulic Main," by Mr. Geo. Livesey; "An Exhauster Speed Regulator," by Mr. J. Storer; "Remarks on Cooking by Gas," by Mr. F. W. Hartley; "Utilization of Breeze," by Mr. J. Somerville; "On an Improved Pressure Regulator," by Mr. T. H. Methven; "On "Methods of Removing Sulphur other than Sulphuretted Hydro-"gen from Coal Gas," by Mr. C. Woodall; and "On the Litho-"logy of Gas Coals," by Mr. J. Paterson.

THE PROVISIONAL ORDERS FOR 1872.

A SECOND Bill has been brought in by the Board of Trade to confirm the following Orders granted by the Board under the provisions of the Gas and Water Works Facilities Act:—

The *Cleator Moor Gas Order* is to empower the Cleator Moor Gas Company, Limited, to construct gas-works in, and supply gas to, the district of the Cleator Moor Local Board, and adjacent parts. The share capital of the company, without further authorization, is not to exceed £6000. Power is given to purchase or lease lands described in a schedule, on a portion of which only may gas be manufactured, but the company is restricted to ten acres. The Order incorporates the Gas-Works Clauses Acts, and confers on the company all the usual powers. The gas is to have the illuminating power of 14 candles, and is to be in all respects in accordance with the provisions of the Gas-Works Clauses Act, 1871. The price is not to exceed 7s. 6d. per 1000 feet, subject to a discount of 10 per cent. for payment at the office of the company within 28 days of the expiration of a quarter. The company are to pay interest for deposits. They are to provide at the works a testing-place, with apparatus, according to the Gas-Works Clauses Act, 1871, the burner to be used being the new London, No. 1.

The *Ossett Gas Order* authorizes the Ossett Gas Company to raise additional capital for the purposes of their undertaking. The third clause of the Order is as follows:—"The Ossett Gas Act, "1855, and this Order shall be construed together: Provided "always that the Gas-Works Clauses Act, 1871, shall be deemed "to be incorporated with the Ossett Gas Act, 1855; and wherever "any of the provisions of this Order are inconsistent with the pro-"visions of the Ossett Gas Act, the provisions of this Order and "of the Gas-Works Clauses Act, 1871, shall be read and con-"strued and have effect as controlling or superseding the incon-"sistent provisions in the Ossett Gas Act, 1855." The Order also incorporates the provisions of the Companies Clauses Consolidation Act with respect to the new capital. Power is given to raise £28,000 additional capital by the issue of new shares or stock, ordinary or preference, or partly one and partly the other, at the full nominal price. The dividend on the preference shares is not to exceed 6 per cent., and 7 per cent. if ordinary. Only £15,000 of the £28,000 can be raised before September 1, 1873. Three thousand pounds of the new capital may be applied in payment for additions and improvements to works recently made or now in progress. The illuminating power of the gas is to be 14 candles. The testing clauses of the Gas-Works Clauses Act, 1871, are incorporated, and the testing-place is to be at the works of the company.

The *Ruthin Gas Order* will confer statutory powers on the Ruthin Gas Company. The capital is not to exceed £8000, without further authorization. The gas is to have the illuminating power of 15 candles, and is to be in all respects in accordance with the provisions of the Gas-Works Clauses Act, 1871. The price is to be on a scale according to consumption, ranging from 6s. 8d. for quarterly consumptions under 5000 feet, to 5s. for consumptions exceeding 30,000 feet per quarter. The company have power, however, to charge an additional 1s. 8d. per 1000 to any consumer who does not pay within a month, which may make the charge 8s. 4d. per 1000 feet to a small consumer not prompt in his payments. The company are to pay interest on deposits at the rate of 5 per cent. per annum. The case of the small consumer is, therefore, this—if he has money on deposit, the company may pay him 5 per cent. interest; if he does not pay his account within a month, they may put *twenty-five* per cent. on his gas bill. The Order provides that gas is to be supplied at a pressure of not less than 8-10ths from midnight to sunset, and of 1 inch and 5-10ths from sunset to midnight. The testing-place is to be at the works of the company, and the test-burner is to be the new London.

The *Swinton and Mexborough Gas Order* confers statutory powers on the Swinton and Mexborough Gaslight Company, and authorizes them to raise £10,000 additional capital, only half of which is to be issued before January 1, 1874. It limits the whole share capital of the company, without further authorization, to £19,500. The dividend on the new capital is not to exceed 7 per cent. if issued as ordinary shares, or 6 per cent. if preference. The undertakers may purchase or take on lease such lands, described in a schedule, as are required for the purposes of

the undertaking, and may acquire three acres in addition. The gas supplied is to have the illuminating power of 14 candles. The price is not to exceed 5s. per 1000 cubic feet within a radius of a mile and a quarter from the gateway of the works, nor 5s. 10d. beyond that distance. The pressure of the gas within such parts of the limits of supply as are on the same or a lower level than the sill of the entrance-gate of the works, is not to be less than an inch and a quarter from midnight to sunset, nor less than two inches from sunset to midnight. The testing-place is to be at the works of the company, and the "London" Argand burner, No. 1, is to be employed; and it is further provided, that any gas examiner duly appointed for such purpose, may at such testing-place, or elsewhere, as and when he thinks fit, test the pressure at which gas is supplied by the undertakers. Interest at the rate of 5 per cent. per annum is to be paid by the undertakers on deposits of money.

There is in this, as in all the foregoing Orders, the saving clause that no penalty is to be incurred for defect of illuminating power or excess of impurity, if it be proved that such excess or defect was occasioned by an unavoidable cause or accident.

Correspondence.

PATENT GAS.

SIR,—Mr. Bower's letter, published in your last issue, as well as your own remarks, requires a few words from me, which I will ask you to insert in your next publication, and after that I will not trouble you or occupy your valuable space with personal matters which are better left out of a journal professedly devoted to scientific pursuits.

My reasons for publishing my letter were partly that you had not noticed it nor even acknowledged the receipt of it in your JOURNAL, although you had time to do so, but chiefly because you had not inserted a letter addressed to you on the 2nd of May from a well-known Scotch engineer, and referring to the Patent Gas Company. Under these circumstances, I think I had the right to infer that you were not disposed to admit into your columns anything in favour of that company.

Mr. Bower's last letter to you was dated the 16th inst., and the letter to me which he publishes was dated the 10th, and received by me on Monday, the 12th inst. The *animus* with which Mr. Bower rushes into print to attack the Patent Gas Company is clearly shown by his not waiting for any response to his application before doing so. The directors of that company at their very next meeting accepted his challenge, and stated, through me, their willingness to afford him every facility to make his desired investigations.

I must again charge Mr. Bower with writing without due consideration of his subject, especially in his figures on the weight of the products stated by me as obtained from a ton of coal.

My figures are as follows:—

8000 cubic feet of 23-candle gas, specific gravity ·510		313 lbs.
Coke as sold, 14 cwt. 2 qr. 0 lb.	1624 lbs.	
Less water, &c., estimated as absorbed in slaking (about 12 gals.)	124 „	
		net 1500 „
36 gals. of oil (from 30 to 40)		374 „
3½ gals. ammoniacal liquor		54 „
Other removable impurities, say		28 „
Total		2240 lbs.

The above figures must speak for themselves in reply to Mr. Bower's statement that I obtain more from a ton of coals than it contains.

It is not my intention to proceed further in a "war of words" with Mr. Bower, or to say more than that as soon as Dr. Odling and Mr. Keates have finished their examination, and made their report on the Patent Gas system, it will be duly published, and then, if Mr. Bower requires it, he can have every reasonable opportunity we can afford him for testing the accuracy of the statements made on the subject.

T. RANDOLPH MELLOR.

Rectory House, Martin's Lane, Cannon Street, London, E.C., May 31, 1872.

SIR,—Three or four days after I had sent my last letter to you on the "Patent Gas controversy," I received from Mr. Mellor a courteous invitation to visit the East Barnet works as soon as Drs. Odling and Keates had completed their experiments.

I think it is due to the directors of the Patent Gas Company that this should be known.

I am now only waiting to be informed when it will be convenient to the company to allow me to make the practical tests which I am desirous of making, the result of which shall be faithfully recorded in your JOURNAL.

G. BOWER.

St. Neots, June 1, 1872.

P.S.—Symes's apparatus: Mr. Grayson's letter answers itself.

Parliamentary Intelligence.

HOUSE OF LORDS.

FRIDAY, MAY 31, 1872.

The BRIDPORT WATER; BRIGHTON CORPORATION WATER; ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT; and WARWICK LOCAL BOARD WATER Bills, were brought from the Commons, and read a first time.

The DARLINGTON BOROUGH SEWAGE IRRIGATION Bill was returned from the Commons agreed to, with amendments.

The ABERYSTWITH IMPROVEMENT WATER, &c.; MANCHESTER CORPORATION WATER, &c.; and ILFRACOMBE GAS Bills, were returned from the Commons with the amendments agreed to.

The GAS AND WATER ORDERS CONFIRMATION Bill was read a second time, and referred to a Select Committee.

A petition was deposited against the BOLTON CORPORATION Bill, from R. H. Ainsworth.

Petitions were deposited, praying to be heard against alteration in the KINGSTON-UPON-HULL WATER Bill, from Sir James Walker, and owners, &c., of property in Anlaby and Tranby;—and in the case of the BOLTON CORPORATION Bill, from the Bolton Gas Company.

HOUSE OF COMMONS.

MONDAY, MAY 27, 1872.

The BRIGHTON CORPORATION Bill, as amended, was considered, and amendments made.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill was considered in committee and reported; as amended to be considered.

TUESDAY, MAY 28.

MANCHESTER CORPORATION WATER, &c., Bill. The Lords amendments were agreed to.

The BRIDPORT WATER, and WARWICK LOCAL BOARD WATER Bills, were read a third time, and passed.

The BIRMINGHAM SEWERAGE Bill, and the BURY IMPROVEMENT AND WATER Bill, as amended, were considered.

The NEWTOWN WATER Bill was read a second time, and committed.

The HAWORTH LOCAL BOARD OF HEALTH Bill was reported.

THURSDAY, MAY 30.

The ABERYSTWITH IMPROVEMENT, WATER, &c., Bill, and the ILFRACOMBE GAS Bill.—The Lords amendments were agreed to.

The BRIGHTON CORPORATION WATER Bill was read a third time, and passed.

The DARLINGTON BOROUGH SEWAGE IRRIGATION Bill was read a third time, and passed, with amendments.

The ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT Bill was read a third time, and passed.

The KEIGHLEY WATER Bill, as amended, was considered, and amendments made.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill, as amended, was considered.

FRIDAY, MAY 31.

The BURY IMPROVEMENT AND WATER Bill was read a third time, and passed.

The WALLASEY IMPROVEMENT Bill was read a third time, and passed.

The WILMSLOW AND ALDERLEY EDGE GAS Bill was reported, without amendment.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill was read a third time, and passed.

HOUSE OF COMMONS.

(*Before Mr.* WEGUELIN, *Chairman; Mr.* DIMSDALE, *Mr.* SALT, *and Mr.* BROWN. *Referee, Mr.* BONHAM-CARTER.

BOLTON CORPORATION BILL

(*Continued from page* 455.)

MONDAY, APRIL 22.

Mr. *Rushton* was recalled by Mr. EDWARDS, and in answer to questions said the pipe through Mr. Ainsworth's land was originally intended to connect with South Lancashire Water-Works, in case of negotiations for the purchase of those works. They also contemplated extending the pipe along the higher ground, down the south side of the South Lancashire district, because that land was higher than they could supply by means of their present service mains from the Sweetloves reservoir. Eventually the supply to Little Hulton, Clifton, and Worsley would go through that pipe, that being part of the district which they had power to supply in bulk, in consequence of the default of the Manchester Corporation. The pipe throughout the whole of its course was necessary for carrying out their general scheme, apart altogether from the consideration of the South Lancashire Water-Works, and had no reference whatever, as far as construction and position were concerned, to an anticipation of the South Lancashire supply. Still, it would give them the opportunity, if all parties were agreed, to supply that district until the Walker Fold reservoir was made. I have had some communication with the corporation respecting the suggestion I made last Friday. We propose that the corporation should not be at liberty to take any water from Mr. Ainsworth's land; there will be a proviso to that effect submitted. With respect to the supply of the South Lancashire Water-Works Company, we propose that the corporation should not be at liberty to supply water to that company at any time before the Walker Fold reservoir is made, without Mr. Ainsworth's consent. The Walker Fold reservoir was intended to contain a certain supply of water, out of which a supply was to be given first to Mr. Ainsworth, and afterwards a supply to the South Lancashire district. I think this will be very much to Mr. Ainsworth's interest. I think also it is very fair to Mr. Ainsworth that no water should be supplied in bulk to the South Lancashire Water-Works Company until the Walker Fold reservoir should be constructed, without Mr. Ainsworth's consent. It never was intended to take his water at all; it could not be done by this line of pipe, because to take water from his land by these pipes would be to destroy all the effect of getting water from the higher level.

In cross-examination by Mr. STEPHENS, *witness* said these clauses had not been sent to the other side, as they had only been drawn up that morning. Apart from any connexion with the South Lancashire Water-Works, the pipes were wanted to supply Halliwell and Heaton, and eventually the districts southward. The country was a ridge from north to south. The South Lancashire Water-Works fell to the left; the Bolton works fell to the edge of the ridge, and these pipes were for the purpose of supplying the higher portions of the district; and, in the second place, for dispensing with the necessity of taking up the existing mains from Bolton, which were not large enough. They did not propose to go down the line of the South Lancashire pipe. In that portion of the district there were about 150 houses at present entirely unsupplied with water. He believed last year there were 500 or 600 houses in the district of Halliwell and Heaton which could not at present be supplied. The reservoir of the South Lancashire Company was considerably higher than their own reservoir. There was also a large population in Deane that wanted a supply, and they were not in the South Lancashire district. The arrangement entered into with Mr. Ainsworth last year was that that part of the streams on his land was to be taken by the South Lancashire Company, giving him a preferential supply, and that part of the streams was not to be taken at all, but to be conducted directly into his works. They were so valuable to him that he would not part with them. There was power proposed to be taken for the construction of a reservoir at the lower part of Little Hulton for the supply of Hulton, Clifton, and Kersley, the existing mains being nearly fully occupied. The South Lancashire Company took five years for the construction of their works; in the present bill the corporation proposed to take seven years. The pipes would be laid at a depth of 4 feet 6 inches below the surface, in order to secure them from breakage by carts.

By Mr. HOLKER: They could not supply Little Hulton, Clifton, and Kersley before the Turton and Entwistle reservoir was made, because there was not wate

enough. They might be able to supply Clifton at a small expense. They had had complaints from the higher level, which they could not at present supply; and they had also had complaints of insufficient supply from districts which they did supply. Practically, they did not intend to supply new districts until they got their Turton and Entwistle reservoir.

Mr. *Harrison Veevers*, examined by Mr. EDWARDS.

I am manager of the Bolton Gas-Works, and have been so 7½ years. I think the works were originally established in 1819, and incorporated next year. They are now held under two Acts, that of 1854 and that of 1864. The share capital at present amounts to £187,689 10s. That is divided into 11,375 shares of £16 10s. each. Those shares are divided into 3909 shares limited to 10 per cent., and the remaining 7466 shares are limited to 6½ per cent. The 10 per cent. are the old shares. The new shares were created under the Act of 1854, which was generally to enlarge the share capital and the boundaries. The Act of 1864 was to enlarge the boundaries still more, and enable the meetings to be held half-yearly instead of yearly. The prescribed amount of the reserve-fund is limited to 10 per cent. of the share capital—£18,768 15s. The company are authorized by the Act of 1854 to invest that in such a manner as they think fit. At present the reserve-fund is £15,453 11s. 5d., which is invested in the works, so that the reserve-fund is part of the capital of the company. Up to December last the total sum expended on the capital account was £189,846. For the year ending the 31st of June, 1871, the total consumption of the whole district supplied was 264,573,200 cubic feet, of which 204,250,000 feet were consumed in the borough of Bolton, and 60,323,000 in the townships outside the borough. Within the same period the amount received for the supply was £45,129 18s., of which £34,364 10s. came from the borough, and £10,765 7s. from the out-townships. The maximum price is 5s. Within the borough, during 1871, the net price of gas to consumers was 3s. 4d. per 1000. The same rate was charged to consumers outside who took 250,000 cubic feet per annum. To other than large consumers outside the borough the price was 3s. 10d., except in distant districts, such as Turton and Horwich, where it was 4s. 10d. In those extreme districts, however, large consumers were only charged the borough rate. The present productive capacity of the gas-works is 320 million cubic feet a year. In the year ending 31st June the actual supply was 264 millions, but in the year ending December last, the actual make was 320 million cubic feet. The loss from leakage, &c., was about 12 per cent. I do not think the present production will suffice to meet the extended wants of the inhabitants. The works require extensive additions for increasing the supply, and for holding the quantity made. It is essential that there should be a considerable expenditure for new mains fully to supply the out-districts. Some time ago the directors were contemplating an application to Parliament on their own behalf, and I prepared an estimate of what expenditure in capital would be required the next 10 years. I considered that about £150,000 would be required to carry on the works of the company efficiently for the next 10 years, but I advised that £200,000 should be asked for. I found the increase of capital for the last 10 years had been at the rate of £10,464 yearly, and during the last 7 years at the rate of £11,750, and as the demand for gas is increasing very rapidly, I concluded that £15,000 additional would be quite little enough on the average for the next 10 years to meet the additional expenditure required to give additional supply. There is a difference, so far as ordinary consumers are concerned, between those outside the borough and those inside of 6d. and 1s. That is entirely a regulation of the company's, and is rendered necessary by the difference in the cost of supply. I estimate the total cost of mains over the whole district to be £61,853. From actual measurement, I estimate the cost in the out-townships at £21,819, leaving the cost of the mains in the borough £40,034.

The CHAIRMAN: It strikes me that the old capital should not be calculated in the interest, because the new capital was granted to the company for the purpose of supplying the out-districts.

Witness: Only for extensions. We could not supply the out-districts without increasing the capital within the borough where the works are situated. The interest upon the excess of outlay would be per annum £759 13s. 11d. I consider that the maximum price of 5s. should remain as it is under the new circumstances, in order that the corporation should have a margin. In 1854 the cost of coal and cannel per 1000 feet of gas made was 11½d. In 1871 it was 16¼d., an increase of 5d. per 1000 feet, being at the rate of 43·4 per cent. The other items of cost have also increased, such as the wages of the stokers; labour and materials of all kinds have increased in price. The total consumption for the year ending the 31st of June last of the Halliwell district was 17,850,000, of which 11,440,000 was supplied at the same price as to consumers within the borough, leaving 6,410,000 at the price of 6d. additional. The total receipt within that district was £3137 18s. 11d. The total consumption in the Astley Bridge Local Board district at the borough price of 3s. 4d. was 5,989,000, yielding £998 3s. 8d., and at the extra price 4,172,000. Of the 31 signataries to the petition, 19 are supplied with gas at the borough price, and two of them are not supplied at all by the company. The consumption in Heaton was 2,699,400, yielding a revenue of £465 4s. 6d., of which 2,085,500 was at the borough price, the remaining being at the extra price of 3s. 10d. There are 1905 consumers in the out-townships altogether.

Cross-examined by Mr. HOLKER: There are three petitions against the gas portion of the bill. The taking of the works by the corporation is practically opposed by nearly £7000 out of £10,000 per annum received from the out-districts. By the 1854 Act we are obliged, after paying the dividends, to appropriate any surplus to a reserve-fund till it reaches 10 per cent. of the capital, and then we must reduce the rates within the borough, but not necessarily in the out-districts. The gas-works were erected in 1819. In 1854 the price was 4s. within the borough, and 4s. 6d. outside. We have reduced the rate three times since then. The last reduction was in March, 1866, of 2d. both within and without the borough. The price proposed to be paid by the corporation for the works is a perpetual annuity equivalent to the 10 per cent. dividends and the 6 per cent. dividends, and a bonus of £2 per share, and the amount of the reserve-fund. We have borrowing powers under our Act to the amount of £41,000. The directors had not decided to again reduce the price just before the corporation announced their intention of taking the works. Such a thing might have been suggested to them. The great bulk of the consumers of gas in Halliwell are situated between the municipal boundary and the parliamentary boundary, within two miles of the centre of the town. The same remark applies to Astley Bridge, and to the works of the subscribers to the petition. I do not think it would be so well to have the two-mile radius as the boundary of the borough for the limit of the lower rate, because the *employés* of the company would have a difficulty in knowing which houses were within the radius. The two-mile radius would take about one-third of Halliwell. The two petitioners who do not use the company's gas must make it for themselves if they use gas.

Mr. RICHARDS, Q.C., said he appeared, with Mr. Clerk and Mr. Pooley, as counsel for the Bolton Gas Company, who in point of form appeared as petitioners against the bill; but an agreement had been entered into between the corporation and the company, which was absolutely unobjected to by any living soul. Of course, so long as the agreement was maintained, they did not appear against the bill.

Mr. *James Knowles*, examined by Mr. EDGE.

I am a coal proprietor residing near Bolton, and also a director of the gas company. I took part in the negotiation for the sale of the gas company's works to the Bolton Corporation. One of the stipulations was that the present differential charge to the out-townships should not be exceeded, that differential rate being 6d. per 1000 cubic feet. The corporation assented to the proposal. The arrangement was made in the interests of the out-townships, and I think it is a fair arrangement. Last year we were considering the necessity of applying to Parliament for power to raise £200,000 additional capital. I have heard Mr. Veever's evidence with regard to an increasing demand for gas, and I agree with him that this additional outlay is required.

Cross-examined by Mr. HOLKER: I have no works in the borough. I do not supply the gas company with coal or cannel. They will not buy our coal, I suppose. I believe the corporation expect to make a profit out of the gas. I have not heard what profit they expect to make beyond the 10 per cent., or that they intend to apply it in aid of the borough rate.

Re-examined by Mr. POPE: The profits made by the company have gone into the pockets of the shareholders. I think the corporation, who take the risk and find the money, are as much entitled to profit as the shareholders. I do not think the consumers have any right to expect a reduction in price in consequence of the works going into the hands of the corporation.

The CHAIRMAN said the committee would require some evidence as to the maximum price of gas, because the committee could hardly permit the corporation to be making a very large profit out of the manufacture of gas, to be expended upon purposes in which the outlying districts had no benefit.

Mr. POPE said the evidence should be forthcoming.

Mr. *Thomas Walmsley*, examined by Mr. POPE.

I am ex-mayor of Bolton, and took part in the negotiations for the sale of the gas-works to the corporation. I believe the arrangement will be beneficial to the town, as there will be a saving in the expenses. The directors fees and the auditors fees will be saved, and the duties of law-clerk will fall upon the town-clerk. I reckon the saving in the cost of management would in those items amount to £525. There would also be a saving in the stock of meters the gas company have in hand. The present stock is about £6000, and it is thought the stock might be reduced to £3500. The saving would be £160 a year in interest. There would be a saving in bank interest of £100 a year; and also a saving in the rating of the pipes. There would also be a saving of £2500 in general expenditure, as the corporation would have more inducement to be economical than the company. The saving in repairing of streets would amount to £50 a year. The corporation would also be able to raise the required additional capital at 2 per cent. less than the gas company, which would amount to £600 a year. We also estimate a saving of £500 in parliamentary expenses. The total saving would, according to this calculation, amount to £4900 per annum, which would represent a saving of about 4½d. per 1000 cubic feet in the price of gas. There would also be a saving to the borough in respect to the breaking up of streets. Both gas and water being in the same hands, public convenience would be consulted in the breaking up of streets. The lighting of the lamps would also be more efficiently performed. In my opinion the corporation will also be able to supply the gas consumers without the borough limits; in my judgment they are protected by the terms of purchase, and also by the fact of the corporation being a representative body, responsible to the burgesses. Out of the 31 signatures to the petition against the bill, 21 are burgesses. Their mills are just outside the boundaries of the borough, and their workpeople reside more or less within the borough. The inhabitants of Halliwell and Astley Bridge especially frequent the town, and use the streets in passing to and from the railway station and the market without contributing to the cost of repairs. In my judgment it is impossible to separate the interests of those two townships from the interests of the town. Sixpence per 1000 feet will be the maximum difference of price between the out-townships and the districts within the boundary. The expense of distributing gas is greater outside than inside the borough, and the consumption of gas is greater inside.

Cross-examined by Mr. HOLKER: We think the additional 6d. ought to be charged to Halliwell and Astley Bridge because they have refused to join us, and want to have all the benefits without incurring any of the risks and losses. Rumworth and Bradford Wards will not be charged the extra 6d., because they have consented to join us. I believe the first consideration on the part of the corporation will be to reduce the price of gas to its minimum rate. I will not undertake to say whether any profits will be made, but should there be any profit after reducing the price to a minimum, it will be applied in aid of the borough rate. The present price of gas is 3s. 4d. per 1000 feet. In 1861 the corporation came for a bill similar to this, which was opposed, I believe, by consumers in the outside districts. I have learned since the present bill was mooted, that there were clauses proposed to be inserted in 1861, on the opposition of the outlying districts, to the effect that the surplus revenues from the gas-works should be invested in Government or other securities until they amounted to £10,000; and that then the corporation should from time to time reduce the price of gas supplied by them. I was told that those clauses would have swamped the bill, which did not break down from the opposition of the outlying districts, but because the corporation and gas company could not agree. We decidedly objected to the insertion of those clauses in the present bill, as well as to any reduction in the price of gas. I consider that the interests of the outlying districts are sufficiently protected.

By the COMMITTEE: The corporation were not unwilling to reduce the maximum price.

Mr. POPE: You may take it that we shall not object to 4s. 6d.

The REFEREE: What is the price paid for the gas-works, capitalizing the amount paid, and including the bonus of £2 to the shareholders?

Mr. POPE: The terms are in the schedule. If you desire it, it shall be worked out in figures.

By the COMMITTEE: I have no computation of the cost of gas per 1000 feet, but I know the price of coal has gone up enormously. Coal which used to cost 18s. 6d. has risen to 25s. and 28s. per ton; and it is the opinion of many persons that it will be a long time before we see the price lowered; therefore, you see there ought to be a good margin allowed. It was stated that £14,000 perpetual annuities at 25 years purchase would represent a capital of £360,000, and there would be £22,750 for bonuses. The corporation will take over everything, and pay £7000 bonus.

In answer to the referee, Mr. POPE said there was nothing in the bill in reference to the illuminating power, but the corporation stood in the gas company's shoes, and their Act would be incorporated in the bill, and the corporation would also come under the restriction in the Gas-Works Clauses Act. The standard illuminating power was 16 candles.

Mr. *Rushton* was recalled. He stated that he took part in the negotiations for the sale of the gas-works to the corporation. He thought that the appropriation of profits to borough improvements was fair as regards the out-townships. There were a number of mills built within 50 yards of the boundary, in order to escape municipal rates, and they used the streets of the town as much as the people inside the boundary. It was reasonable that the borough should get something in the shape of profits towards compensating them for the risk and trouble of managing the works, and that was why they proposed to appropriate the profits to improving the streets, and in other improvements, instead of in reduction of rates. The price proposed to be paid to the company was a bonus of £7000 for the goodwill. It was considered that if the gas company went to Parliament and asked for a large capital they would get 6½ per cent. upon the capital expended; and that it would necessarily result in reduction to the consumers when there was a proper guarantee-fund. In the face of the increase in the price of coals, and the possibility of accidents, he did not think it would be safe to reduce the price below 4s. 6d.

Cross-examined by Mr. HOLKER: He thought Halliwell should pay 6d. more than the in-lying districts, because it would cost 6d. more to distribute the gas. He objected to any limit being put upon the amount of profits made, or to any control being exercised beyond the control in the hands of the ratepayers.

Mr. *Hinnel*, town-clerk of Bolton, said he had put himself in communication with gas companies in the towns in the Lancashire district, and had obtained

from them all the particulars relating to price, application of profits, &c., which he had tabulated.

Cross-examined by Mr. HOLKER: He was aware that in Manchester the profits from gas had been applied to many public improvements in that town.

The committee then adjourned.

TUESDAY, APRIL 23.

Thomas Greaves Barlow, Esq., examined by Mr. POPE.

I am a civil and consulting gas engineer, and have had more than 40 years experience in connexion with the manufacture and distribution of gas. I have frequently been consulted in reference to the transfer of the undertakings of gas companies to the public authorities of the districts which have been supplied by them. In the cases of Leeds, Glasgow, Dundee, and Aberdeen, I have been concerned on the part of the purchasers. I have made myself master of the details regarding the Bolton Works, as given by Mr. Ververs, and have seen the agreement drawn up between the corporation and the company. From my experience, that seems to be an equitable agreement, as far as the public interests, as well as the interests of the gas company, are concerned. I do apprehend that there will be such an advantage to the public from the acquisition of the gas company's works, as has been described by the members of the corporation. I have considered the question of the cost of production, and the maximum price. I do not entirely agree as to the extreme reduction of expense anticipated from the works being in the hands of the corporation. There would be some economy, but not so large an economy as has been mentioned by one of the witnesses. All through the country the cost of coal has advanced from 50 to 70 per cent., and the cost of wages from 40 to 50 per cent. I am concerned for the Leeds Corporation at the present moment, and there they have had to give an advance of something like 30 per cent. to their stokers. The increased cost of production would more than balance the economy which might be effected by corporation management. I calculate that the extra expense of production at the present rate of materials and labour will be at least 7d. per 1000 cubic feet. The corporation might by economy so manage that the gas should not cost more than 5d. per 1000 feet in addition.

Mr. POPE: There being an increased cost in production, we are agreed that the maximum price should be fixed so as not to allow the corporation to make an exorbitant profit out of the consumer. Do you think it would be safe to fix a maximum price under existing circumstances for less than 4s. 6d.?

Witness: No; I think 4s. 6d. is a fair price. If it is found to be too high a price, and the corporation are making too large a profit, the consumers would no doubt take the matter up, as they did in Manchester, and compel the corporation to reduce. There was a large combination of consumers; they took the matter up, and, in fact, turned out the members of the corporation who were members of the Gas Committee, and compelled them to reduce the price from 5s. to 3s. 2d.

Mr. POPE: As the matter stands, it seems that in existing circumstances, the gas company have been able to pay their dividends, and lay by a reserve-fund at 3s. 10d. According to your view they would not be able to pay their dividends and realize that reserve-fund at that price?

Witness: Certainly not. They would have drawn upon their reserve-fund or increased the price. I think 4s. 6d. would be a fair maximum under all circumstances.

Cross-examined by Mr. HOLKER: I believe the present charge is 3s. 6d. in the borough, and 4s. 2d. outside. The present low price at Manchester is owing to an agitation got up on the part of the consumers; they forced the corporation to reduce the price. They have, I suppose, left such a margin as makes it remunerative. The price at Bury is 2s. 10½d., but that would only be to large consumers; the bulk of consumption is at 3s. 4½d. There is no obligation on the Corporation of Glasgow to apply profits to the reduction of the price of gas. Aberdeen and Dundee are under such restriction. The corporation, though they take over the gas, are not allowed to apply the whole profit to the benefit of the towns, but they are periodically obliged to reduce the price of gas when the profit justifies such reduction. In Dundee the sale of the gas-works was not to the corporation, but to a commission of 17 or 18 members, of whom the corporation nominated, I think, four or five, and the rest were nominated by public bodies in the town. There the profits are exclusively applied to the reduction in the price of gas. In Dundee the whole of the rateable property is liable to a tax to make up any deficiency. They have nothing in the shape of a reserve-fund. They have a sinking-fund to pay off the mortgage debt, and in case of any extraordinary deficiency or accident they can come upon the ratepayers. I remember the application to Parliament by the Bolton Corporation in 1861. I may have appeared as a witness against the corporation on that occasion.

Mr. HOLKER: I believe you then stated that it was not desirable that the gas should be handed over to the corporation as a rule?

Witness: My opinion on that point is considerably changed. For seven or eight years I have had a good deal to do with corporations in the management of gas-works, and I have seen many points of advantage. When I gave that evidence in 1861, I thought there was more to be got for the public out of companies by pressure and by the action of the Gas-Works Clauses Act than there was out of the corporation; but I have seen, in all the cases in which I have been concerned on the part of corporations, that they would be enabled to reduce the price of gas very considerably, and still to pay their expenses. It must, to some extent, depend upon the pressure put upon them by the gas consumers on the one side, and the general ratepayers on the other.

Re-examined by Mr. POPE: Dundee is hardly a case in point, because the commissioners had no purpose to which they could appropriate profit. In Aberdeen there are, first of all, two funds provided—the sinking-fund and the reserve-fund. There is also a provision for the town council to lay a gas contingent guarantee rate, so as to make up any deficiency which may arise with reference to the payment of the annuities, and so forth.

Mr. POPE: Although no doubt the Aberdeen Act is an authority in legislation for dealing in a certain way with gas profits, it is hardly an authority for the suggestion of my friend, that the outsiders should have their full share of the profits without providing for the contingencies?

Witness: In Aberdeen the old company were supplying the out-townships at the borough price, and that provision was continued in the Act; then they were put under these conditions, as to being liable for deficiencies. Subject to such exceptions as the Aberdeen instance affords, the general course of legislation is in some way or other to carry gas profits to the improvement rate, or, at all events, to the purposes of the borough.

By the COMMITTEE: I have heard that the Bolton Gas Company have intended to apply for additional capital, and that they propose to ask for 6½ per cent. upon that capital.

Mr. POPE: They therefore calculate not only upon the extension of consumption, but increased profit upon what they make at present?

Witness: I do not know upon increased profit what they make at present; they may increase the maximum allowed by the Act. The 6½ per cent. upon the new capital would have been in the form of a profit.

Mr. POPE: The corporation intend to extend the works, and of course expect an increase to return a profit of 6½ per cent., as the company would. What I want to ask your opinion about is this: if by the increase of consumption the Bolton Corporation are expecting to get a profit, would not the maximum be fixed somewhere about the present rate rather than 8d. or 10d. above it?

Witness: Certainly not. In the first place, I am quite certain they could not pay their prescribed dividend with the material at the rate at which it is; of course that would have to be provided for—the additional 7d. per 1000 feet would bring the 3s. 4d. up to 3s. 11d. Then, in addition to that, they ought to provide for a depreciation fund. You may take the duration of gas-works at 30 years, and a fund is necessary to reproduce them. Upon a careful calculation that I have made in many other gas-works, I find about 1½ per cent. on the total amount expended is necessary to be applied in the shape of a reproduction fund, in addition to the reserve-fund, because the reserve-fund is to make up a deficiency of dividend or to meet any extraordinary contingency. I have advised corporations as to the terms on which undertakings have been purchased. In most cases the companies have got 24 years purchase on the profits. Here they do not get that; they get merely what they are entitled to under their Act, and a bonus of £6000 or £7000 over and above the reserve-fund which they have already accumulated.

Mr. POPE: Do not the shareholders set the same income on a very much improved security?

Witness: I do not know what the value of the annuities may be in the market, or how many years purchase, but I should not think they are very much above 20 years purchase. The transaction could, of course, be carried out by a stock or sinking fund; but there is the question as to whether the company would have accepted that. They were not bound to accept anything. I never heard of any opposition on the merits as to purchase, except by reports I have seen of meetings. Some of the shareholders thought it was not sufficient, and that they might have got more. There are as many precedents as to the payment by annuity as there are for payment in stock. I think, considering the circumstances, that 4s. 6d. is a fair maximum, with the possibility of its being reduced by pressure on the part of the consumers. I do not think the corporation would be sufficiently protected with a maximum of 4s. I do not think we have seen the extent to which coal is going to rise. I am paying on the part of some clients 10s. 6d. a ton for what I used to get at 6s. 6d. I asked a person lately what price he would take on a three years contract, and he said he would not take a three years contract at less than 16s. Coke and tar do not rise in proportion. The coke market is a peculiar one; it is principally among the smaller shopkeepers and inhabitants, and they would take a certain quantity at a certain price, and if you raise the price you will not get them to take it. Bolton and Manchester get the same coal, but Manchester has a very much larger consumption. There is certainly a large consumption at Bolton, and they are making provision for an increase from 264 to 500 million cubic feet.

The REFEREE: That is quite large enough to admit of their charging the less price; 500 millions is a sufficiently large quantity to justify a very low price.

Witness: When it reaches that. I do not know the price of coal at Bolton. I should think the mixture they make is about 18s. a ton. The present price in London is about 16s. 6d., and the illuminating power of 16 candles. The illuminating power under the Bolton Gas Act is 16. The maximum price under the Metropolitan Acts is 3s. 9d.

The REFEREE: 18s. is rather high for the price of coal at Bolton.

Witness: There is such a demand for cannel in those districts. They would not want much cannel to make 16-candle gas. Though they are only obliged to supply 16-candle gas, yet what they actually do supply is nearly 18. They use about one-third of cannel and two-thirds of ordinary coal.

The REFEREE: We have it in evidence that the price of coal is about 11s. a ton.

Mr. POPE: That is under the contracts existing.

The CHAIRMAN: Do you think the corporation would supply a higher illuminating power if the maximum were fixed at 4s. 6d.?

Witness: If it is thought desirable, they could.

Mr. POPE: The gas manager says he thinks if Mr. Barlow's suggestion of 4s. 6d. were accorded, that we might undertake to produce 18-candle gas instead of 16-candle gas. We do, in fact, produce 18-candle gas, and we should not object to come under an obligation to do so, provided we have a sufficient margin to make it possible.

The REFEREE: Do not you think with coals at 11s. a ton, 4s. 6d. is a very high maximum?

Witness: Well, it is rather, if you can secure a continuance of coal at 11s. a ton.

The REFEREE: And then, taking into consideration the economy with which a public body is supposed to administer gas-works, do not you think——

Witness: I do not believe that the economy is to reach to such an extent.

The REFEREE: You think the effect of that transfer from a private body to the corporation is very much exaggerated.

Witness: I think the great advantage of a corporation in a case of this sort is this, that they are able to get their money at 4 per cent., and to lend it out at 6½.

This closed the case for the corporation, and Mr. MUNDELL and Mr. STEPHENS having addressed the committee, evidence was called on behalf of Mr. Ainsworth against portions of the water-works details.

Mr. HOLKER addressed the committee in opposition to the gas portion of the bill. Practically that portion of the scheme was opposed by all the outside districts. The total payments to the gas company were at present £45,000, out of which £11,000 was paid by the out-districts. The parties whom he represented paid about £6500. These gentlemen did not desire that the gas-works should be handed over to the corporation; they said it was not a politic measure, and, certainly, as regards the out-districts, that it was not a good measure. They preferred to remain under the jurisdiction of the gas company—under the provisions of the 1854 Act. The company were subject to the provisions of the Gas Clauses Act of 1847, one of which was that the company was not allowed to earn a greater profit than 10 per cent. on certain shares, and 6½ per cent. on other shares; then, they were to invest the surplus profits in raising a reserve-fund to meet an extraordinary outlay; and when the reserve-fund had reached a certain amount, then the company were bound to reduce the price of gas to the consumer. This was found a valuable protection to the consumers, because, as soon as this state of things had arisen, the consumers could demand a reduction in the price. It was proposed by the corporation to hand over the whole undertaking of the gas company to themselves, and not to place themselves under these restrictions, or under any analogous restrictions. They claimed not to be restrained as to the profit they might make, and not to be compelled to reduce the price of gas. On the contrary, they proposed to apply the profits in aid of the district improvement rate of the borough of Bolton, on the ground that the inhabitants of the out-districts made use of the streets of Bolton, and had the benefit of the improvements. Then they further alleged that there was no probability of a reduction in the price of gas taking place, inasmuch as the limit of the reserve-fund had never been reached, and, moreover, the company had contemplated coming to Parliament for an increase of capital. The answer to that was, the fact that on three occasions the company had reduced the price of gas just before the reserve-fund was filled up. They were in a similar position at the present time; and, if matters were allowed to remain undisturbed, there was no doubt that in the course of a year or two the consumers would have been able to ask for another reduction in price. There was nothing in the application for increased capital which would stand in the way of his proposition; because the increased outlay, necessary to meet the increased demand for gas, would have produced increased profits;

so that the dividend to the shareholders would have been kept up, and the reserve-fund would not have been diminished. His clients objected to being placed under the corporation, because by the terms in the bill the corporation were bound to raise a sum of money to pay the annuities to the shareholders, and also the bonus of £2 a share. They were thus placing a millstone about their necks, which would for a long time prevent their lessening the price of gas. Again, the out-districts would be at the mercy of the corporation, because it was idle to say that sufficient protection against injustice would be found in the good sense of the ratepayers. The question was whether the committee would put it in the power of the corporation to work any injustice. In the bill of 1861, clauses were inserted to fix the limit of the reserve-fund at £10,000, and then to apply the surplus profits to the reduction in price. The corporation would not accept that proposition, and in a pet struck the whole of the gas clauses out of the bill. They came to Parliament again this year, manifesting precisely the same spirit, and he asked in the interests of the out-districts that the corporation should not be exempt from the restrictions which were imposed upon the gas company. The learned counsel concluded by pointing out that if a two-mile radius from the town-hall were to be adopted, the inhabitants of Halliwell and Astley Bridge would be placed in the same position with regard to price as the wards within the borough.

WEDNESDAY, APRIL 24.

Major *Thomas Hesketh*, examined by Mr. HOLKER.

I live at Summerfield, in Great Lever, and am a partner in the firm of Stones and Co., cotton-spinners, Astley Bridge. I am a member of the Bolton Corporation, and also a member of the Local Board of Astley Bridge. I have given the gas question my careful consideration, and I am of opinion it is not a desirable thing that the gas supply in the out-districts should be in the hands of the corporation, as proposed by the bill. That opinion is shared by a great many persons in Astley Bridge. There are a great many large manufactories in Astley Bridge. Our own consumption of gas is about 3 million cubic feet per annum. I think it would be better for us if the gas company retained their undertaking, because before long I anticipate there would be a reduction in the price of gas. They have nearly reached the limit of their reserve-fund. There have been three reductions since 1854, notwithstanding the rise in the price of materials. If the bill were sanctioned, and the gas-works transferred to the corporation, I think the tendency would be to increase the price of gas. I do not think it desirable the corporation should take the surplus profits and apply them to improvement purposes, but that they should be applied in reduction of the price. It is true the inhabitants of Astley Bridge use the streets of Bolton; but then, on the other hand, the Bolton people make far greater use of the streets in Astley Bridge in procuring stone from the upper part of the district. If the undertaking of the gas company is transferred to the corporation, I think the corporation should be placed under the restrictions proposed in the Act of 1861, and that the reserve-fund should be fixed at £20,000. At all events, there ought to be a restriction against spending the whole of the profits in aid of an improvement rate. Astley Bridge is within two miles of the centre of the town, and I see no reason why the price of gas there should be higher than in the borough. There is no greater expense in distributing the gas in Astley Bridge than in Rumworth Ward.

Cross-examined by Mr. POPE: I live at Great Lever, and have to pass through Bolton to get to the works, and our carts also make use of the streets. The stone from the Astley Bridge district is brought through Astley Bridge. The local board of Astley Bridge are unanimous in their opposition to the bill. There has been no public meeting of the inhabitants held on the subject. I believe the gas company are more likely to manage the works economically than the corporation, because the corporation have only an indirect interest in the works. I also think the corporation cannot manage the works so economically, because they would be bound to pay the present profits in perpetuity, and to pay a bonus. I should not object to their making the same amount of profit that the company make, provided the out-districts are not placed in a worse position.

Mr. *Joseph Musgrave*, C.E., examined by Mr. HOLKER.

I am a civil engineer in Little Bolton, and chairman of the Local Board of Halliwell. The populous part of Halliwell is within the two-mile radius. I see no reason why they should not be supplied with gas on the same terms as the people within the borough. I have heard Major Hesketh's evidence with regard to the feeling of Astley Bridge, and I can say the same with regard to Halliwell. I should not object to coming under the corporation if our position is not worse. I think, however, that a restriction should be inserted with regard to the reserve-fund, and that the corporation should not be allowed to apply the profits in aid of the rates.

Cross-examined by Mr. POPE: They ought to apply them to reduction of price. I am willing that the corporation should have a small profit. I do not think that the corporation would manage the works so well as the company, on the principle that corporate bodies cannot work so economically as private companies.

Mr. POPE: What do you mean, then, in your petition, by saying that you wish to take the supply of gas into your own hands? Yours is a corporate body.

Witness: But the Bolton Corporation is a large body, and they are more difficult to deal with. The local board consists of twelve members. I understand the management of the works in the hands of the corporation will be entrusted to a gas committee. I am not aware that the committee would consist of twelve persons.

Capt. *C. F. Ainsworth*, examined by Mr. HOLKER.

I am a cotton-spinner at Great Lever, and am a considerable consumer of gas. I have signed the petition against the bill. The works are within two miles of the centre of the town. I do not think it desirable that the gas-works should be transferred to the corporation without some clauses being introduced to compel a reduction of price when the proper time arrived. If that is done, I shall be satisfied; and as long as the corporation do not make our position outside worse, I see no objection to their having a portion of the surplus profits, to be applied as they think proper. Being within the two-mile radius, I do not know why we should be charged more for gas than the inside of the borough.

Cross-examined by Mr. POPE: I understand the gas company is not limited as to the differential rates between the inside and outside of the town. I was not aware that the corporation would be bound for ever not to make the difference greater than it is at present, except to large consumers. As far as I understand the bill, the corporation would buy the gas-works at a certain price, and they propose to supply consumers at a maximum price, and to apply the profits made within that maximum at their discretion.

The bill of 1861, and the minutes of evidence given before Parliament on that occasion, were put in by Mr. HOLDEN, the solicitor for the opponents. He stated that the out-districts opposed the bill of 1861, and that clauses were inserted in the progress of the bill through Parliament, limiting the reserve-fund to £10,000, and directing that any surplus beyond that should be devoted to reducing the price. The corporation struck out the whole of the gas clauses. In reply to Mr. Pope as to the right of the corporation to make a profit, witness said in his opinion their first object should be to minimize the price of gas, and beyond that he should not object to their having a moderate reserve-fund.

Mr. POPE then replied upon the whole case. After referring to the question of boundary, he said that with respect to the opposition of Mr. Ainsworth, he was as much puzzled now as he was at the beginning to know what it was that gentlemen wanted. They had offered to insert clauses to protect his interests; but no, he would have nothing to do with them. His objection was to laying a 12-inch pipe through his grounds as an intolerable nuisance to a gentleman. Smithhill's Hall was no doubt an interesting old hall in the neighbourhood of Bolton, but, as it commanded a view of the factory chimneys in the district, which were not very ornamental features in the landscape, he could not understand how the laying of a pipe upon his property could be looked upon as a nuisance. The corporation were very anxious to meet Mr. Ainsworth. They were willing to give him clauses prohibiting the corporation from interfering with any of his streams or reservoirs; and they would even construct such a by-wash in his reservoir as would obviate any danger of disaster. They would undertake not to supply the South Lancashire Water-Works with water without his consent, or they would adopt any other plan that would arrive at the same result.

The CHAIRMAN: We will spare you the trouble of addressing the committee on that point. The committee are of opinion that Mr. Ainsworth should have protective clauses. In other respects we think his case has broken down.

Mr. POPE: We are quite willing that that should be done.

Mr. STEPHENS: I regret to hear the announcement of the committee. Mr. Ainsworth's objection is really so serious that if that be the view of the committee, we have no alternative but to withdraw.

Mr. POPE said this left him only the matter of the gas to deal with. That had narrowed itself down in fact to what was a clause opposition, because it was admitted now, although there might have been some discussion as to the terms of purchase. No objection was raised by the opponents to the acquisition of the gas-works by the corporation, provided they were secured in as practically a good position as they would have been in had the works remained in the hands of the company. He did not know whether his friend brought forward the clauses of 1861 as substantive clauses or not, but he preferred to discuss the question as an oppesition to the preamble. He submitted that it was only fair that where outside customers were not partners in a concern, they ought to let the partners make a reasonable and moderate profit upon the enterprise. It was now admitted by the opponents that the corporation might make moderate profits, and apply them in whatever way they liked, provided those profits were not exorbitant on the part of the corporation. They did not desire to put their hands into the pockets of outsiders, and make immoderate profits. The question was, how was that to be arrived at? Certainly not by introducing the clauses of 1861, which in his experience was wholly exceptional legislation, but by fixing such a maximum price as would secure to the corporation what might appear to be a reasonable and moderate profit upon their outlay, the surplus to be applied either to the general purposes of the borough or to the improvement rate of the borough. The burgesses being the parties responsible were the parties to receive directly the benefit of the expenditure of profit, although, in point of fact, the outsiders participated in it also. His friend suggested that some machinery should be introduced for the purpose of enabling the outsiders to regulate the price. He did not know of any Act, even the Aberdeen Act, where that machinery was provided. In that Act, there was a provision for a sinking-fund, and provision for a reserve-fund; the town council were to fix the price of gas annually; and there was power given in the Act to raise a contingent gas rate, in the event of the price fixed for the twelve months resulting in a loss. Obviously that could not be done here. He asked the committee whether they could go against the ordinary run of legislation on this subject, unless some very strong ground was shown indeed. The question then was, how would they secure that the profit should be moderate, that is, that the corporation should make about as much profit as the company was now making, which was admitted to be a fair profit. His friend did not help them in the slightest degree by offering any suggestion. He ventured to think that the fixing of the price of gas would regulate the whole thing. Upon that point he would not trouble the committee, for they were more familiar with the subject than he could be. He submitted that in the interests of the public as well as the interests of the corporation, they ought not to narrow the corporation too much. The present maximum price was 5s. The corporation were willing to go down to 4s. 6d. They did not think they could safely go lower. With regard to the two-mile radius, he would leave it in the hands of the committee. If that had been the only discussion between his friend and himself there would not have been much difficulty in coming to terms.

The room was then cleared, and on the readmission of the parties,

The CHAIRMAN said: The committee have decided that the preamble of the bill, as far as the opposed matter is concerned, is proved; but they wish to intimate that in the matter of gas they intend to propose as a maximum a rate of 4s. within a two-mile radius, and 4s. 6d. for the districts supplied beyond.

Mr. POPE intimated that the corporation would assent to these terms.

Mr. R. G. HINNELL, the Town Clerk, then formally proved the unopposed parts of the bill, and the committee went through the clauses, and made amendments in conformity with their decision.

Legal Intelligence.

VICE-CHANCELLOR'S COURT.

WEDNESDAY, MAY 29.

(*Before Vice-Chancellor Sir* R. MALINS.)

CLOWES *v.* THE STAFFORDSHIRE POTTERIES WATER-WORKS COMPANY.

Mr. PEARSON, Q.C., and Mr. MONTAGUE COOKSON appeared for the plaintiff; Mr. COTTON, Q.C., and Mr. SPEED for the defendants.

This was a bill to restrain the defendants "from permitting the water of the river Churnet, in Staffordshire, to remain in its present muddy or turbid condition," and to compel them to take measures for restoring the water to the condition in which it was before the construction of the Tittesworth reservoir.

The plaintiff in the suit, Miss Clowes, is entitled, as tenant for life, to three dye-houses in Mill Street, in the town of Leek, standing on the east bank of the river Churnet, now, and for many years past, leased to Mr. Hammersley, a silk dyer, and having, as the bill states, been used as works for dyeing silk for upwards of 100 years. The bill stated that the manufacture of silk is the staple trade of Leek, and that that town has attained great celebrity for the excellence of this manufacture; that pure and soft water being necessary for the purpose of washing and dyeing silk, the water of the river Churnet, which is a mountain stream with a quick rise and fall, was peculiarly adapted for the purpose, and that in particular the colour called "raven" could only be produced by using its waters. There were to the south-west of Leek certain springs called "seners," or "sinners," springs which it was said yielded a supply of water to the Churnet equal to about 1,000,000 gallons per diem, and in the year 1853 a company, now represented by the defendant company, obtained statutory powers for supplying the pottery towns, situate about 10 miles from Leek, with pure water, under which powers they constructed a large reservoir at Ladderedge, near those springs. As, however, this would have the effect of abstracting a considerable amount of water from the Churnet, the company, under the authority of the same Act, constructed a

compensation reservoir near the springs for the purpose of storing water to supply the Churnet for the use of the owners of mills on that river and on the Dove, into which the Churnet flows. This reservoir being inadequate, the company, under the authority of another Act, in 1856, bought 40 acres of land in a narrow valley at Tittesworth, about a mile and a half above the dye-works, dammed up and stored the flood water of the Churnet, and constructed the Tittesworth reservoir, which is over 40 acres in extent and from 30 ft. to 40 ft. deep, the stream of the Churnet flowing into this reservoir at its upper end, and being discharged from this lower end by a series of pipes. The plaintiff's case was, that the effect of the defendant's works was to destroy the purity of the water of the Churnet and to render it comparatively valueless to her tenants, the dyers particularly, from the muddy state in which it continued for many days after a flood. It appeared that soon after the completion of the reservoir Messrs. Hammersley began to complain of the state of the water, and that the company from time to time made efforts to remedy it, and among other things, constructed a filter, which for a time was satisfactory, but the complaints were afterwards renewed, and the plaintiff alleged that since the death of Mr. Liddle Elliot, the engineer of the company, they had declined to do anything further, and that the water was so much fouled that she was in danger of losing her tenants without the probability of being able to replace them.

The arguments which had lasted the two previous days were this morning brought to a close.

The VICE-CHANCELLOR, in giving judgment, said, it was admitted that the reservoir was constructed in 1857, in compliance with an Act of Parliament, and that the water flowed into and out of it as that Act intended. The plaintiff did not allege any violation of the statutory powers in the manner in which the works were constructed, and the defendant did not deny that the effect of those works was to cause some degree of injury to the plaintiff's tenants. It was, however, inevitable that a river like the Churnet, some 40 ft. wide and from 4 ft. to 6 ft. deep, should cause some deposit, and what was the measure of the damage here sustained? If the plaintiff lost her tenant and could not get another the measure of her damage would be her life interest in the rent, which was £120 per annum. She had not, however, lost her present tenant, and if she did his Honour was satisfied from the evidence that she could get another. Her damage was almost imaginary, and the measure of her tenant's damage was the construction of a filter, which would cost about £400 or £500, and it appeared from the evidence that filters were used on the Rhone, which supplies the water used for the beautiful silks of Lyons. In either case, if damage was sustained, there was a proper and adequate remedy at law, and his Honour was satisfied that he ought not to interfere by an injunction, the mode of obedience to which he did not see, as the only thing suggested was that the company might clean out the reservoir, an operation which might cost £20,000. There was, moreover, another insuperable objection. It was well settled that whenever the Legislature authorizes the doing of a certain thing, and damage results from it, the remedy is under the provisions of the statute legalizing what otherwise would be a wrong, and not by action at law. That rule was well laid down by Lord Cairns, in "The Hammersmith Railway Company *v.* Brand" (*L. R.*, 4 *Eng. and Ir., App.* 215), and by Mr. Justice Blackburn in "The Mersey Dock Trustees *v.* Gibbs" (*L. R.* 1 *Eng. and Ir., App.* 112). Here the Legislature had given a remedy which could be enforced under the 68th section of the Lands Clauses Consolidation Act, 1845. On the whole his Honour came to the conclusion, first, that the plaintiff had not sustained such an amount of damage as entitled her to an injunction; secondly, that whatever damage she had sustained was capable of ascertainment and compensation; and thirdly, that such damage, if any, was a consequence of the exercise of parliamentary powers, and the remedy must be sought under the clauses of the statute applicable thereto. The bill must therefore be dismissed, and, as the company insisted upon it, with costs.

Miscellaneous News.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary Meeting of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, May 28.

The PRESIDENT (Sir Moses Montefiore) commenced the proceedings by saying: Gentlemen, it is a great happiness to me to meet you again. I trust you will increase that happiness by allowing me to propose that our highly esteemed friend, Philip Twells, Esq., take the chair on this occasion.

Mr. TWELLS having taken the chair,

The SECRETARY (Mr. Albert F. Jackson) read the notice convening the meeting.

The CHAIRMAN, on affixing the corporate seal to the register, stated that the present number of shareholders in the association was 1533, being an increase of 76 since the last meeting.

The SECRETARY read the following report of the directors for the half year ending Dec. 31, 1871:—

The present half-yearly ordinary meeting of the shareholders has been convened agreeably to the company's Act of Parliament, for the purpose of receiving a report from the president and directors upon the affairs of the association, and for declaring the dividend for the half year ended the 31st of December last. With reference to the condition of the several stations there is nothing very special to report. They were all in thorough repair, and in good working order. The results produced, and generally the conduct of the affairs of the association (ably superintended, as the business has continued to be, by Mr. G. W. Drory, assisted by the various engineers and other officers,) have given every satisfaction.

Gas Made.—The total quantity of gas made at all the stations in the half year ended Dec. 31, 1871, was 2,381,398,600 cubic feet. The total quantity made in the corresponding half year of 1870 was 2,135,652,490 feet, being an increase of 245,746,110 feet, or at the rate of about 11½ per cent. increase. The increase of the same period of 1870 over that of 1869 was at the rate of about 5½ per cent., the smallness of the augmentation being attributable to the late war between France and Prussia.

Lights.—The total number of lights at all the stations on Dec. 31, 1871, was 919,212. The total number of lights on Dec. 31, 1870, was 857,978. These figures show an addition of 61,234, or of (about) 7¼ per cent. The increase of the same period of 1870 over that of 1869 was rather more than 6¼ per cent.

The total length of mains laid at the end of 1871 was (about) 1114 miles, being an increase upon 1870 of (about) 33 miles.

The value of the secondary products—coke, tar, and ammonia—was, in the year 1871, not quite 74 per cent. of the cost of the coal. In 1870 it was rather more than 74 per cent.

During the half year now under review, the subsidiary works at Schöneberg, a growing suburb of Berlin, made considerable progress, and will shortly be completed.

At Lille the tank and gasholder for the new works were finished, and those works are now in full operation. At Cologne also a new holder has been erected, in place of an old one of smaller size, and additions have been made to the retort-houses and the purifying apparatus. At Floridsdorf, a suburb of Vienna, new works were established, and gas is now supplied from them.

At Antwerp, and in some of the "Faubourgs" of Brussels, the association during the half year ended the 31st of December last, made considerable reductions in the price of gas, both for the public and private lighting.

Owing to the impossibility of getting the necessary coal supplies from the mines on the Continent, the directors were, during the half year ended the 31st of December, 1871, under the necessity of sending very large quantities of coal from England to several of the stations. The total excess of coal expenditure in the second half of 1871, over that in the corresponding half of 1870, was no less than £41,000. Notwithstanding this large excess, the successive diminution of prices of gas above alluded to, and the greatly increased costs of materials and labour employed, both the rental and the profit were larger than in the half year ended the 31st of December, 1870. The prices of coal, iron, labour, &c., which were high during the half year now under consideration, have since that date continued to rise, and these circumstances can scarcely fail to affect the future profits of the association.

The president and directors have now in conclusion to invite the attention of the shareholders to the accounts, which have been duly audited, for the half year ended the 31st of December last.

From these accounts the directors have, in accordance with the provisions of the Companies Clauses Consolidation Act prepared a scheme showing the profits of the association for the last half year, and the portion thereof applicable to the purposes of dividend, which the president and directors recommend to be now declared—namely, a dividend of £2 per share, payable free of income-tax, on and after the 15th of June next.

The directors who go out by rotation are—Benjamin Attwood, Esq., Philip Twells, Esq., and James Helme, Esq.

The auditor who goes out is—Thomas Newton Stokes, Esq.

These gentlemen are all eligible for re-election, and offer themselves accordingly.

The CHAIRMAN: Gentlemen, I hope I am right in the inference I have drawn from the reception you have given to the report just submitted to the meeting. I have gathered from the way in which you have treated it that you do not consider its contents as calculated to occasion you any great degree of discouragement. It certainly does appear to me as very satisfactory that our earnings for the last six months not only enable us to keep up the dividend we have been receiving for several half years past, but also to make ample provision for the very expensive extensions which have been called for at almost all your stations. On the other hand, the results are not quite so satisfactory as they might have been, because the extremely high price of coal, and labour, and freight, and other things, has rendered the amount of your profits less than, perhaps, we had reason to hope for. If we take the profits of the year 1869 (I say 1869 in preference to 1870, because 1870 was the year of the war, and therefore hardly a fair year with which to make a comparison), we find that we stood in this position. The rental in 1869 was about £779,000, and during that year our profits were £344,000. The rental in the year 1871 was £879,000—about £100,000 more than in 1869—and if we could establish our profits by the rule of three, we should say as a rental of £779,000 produced a profit of £344,000, a rental of £879,000 ought to produce a profit of £390,000, whereas the real profit we have obtained is only £358,000. But when we recollect that we use between 400,000 and 500,000 tons of coal in the year, and that the price of each ton of coal last year was about 2s. 5½d. more than in 1869, and that labour was increased in cost to a great extent, the diminution in our net profits is largely accounted for. In addition to these things we have also, as we have stated in the report on this and several previous occasions, been gradually reducing the price of gas at different stations—for instance, at Frankfort and Vienna. During the year 1871 we were obliged to reduce the price of gas in the faubourgs of Brussels, and also at Antwerp. These circumstances, combined together, will account for our profits not being quite so great. They have kept up to the point which they had attained before, and indeed gone rather beyond that, but they have not reached the amount we might fairly have hoped to secure from the very large increase of outlay which the extensions have required. At the same time we have considerable encouragement from this fact that the price at which we are selling gas is exceedingly low, so low, indeed, as to prevent in a great measure or to disarm any opposition to our operations. If we take the amount received from the sale of all our gas on the one hand, and the quantity actually produced on the other, we find that the price is only about 3s. 9d. per 1000 cubic feet. I do not mean to say that we sell gas on the average at 3s. 9d., because a part of the gas we make is consumed on our own premises, and a part is unavoidably lost by leakage and other accidents; but if we take the amount we received for gas-rental upon the quantity of gas actually made, it shows that we only obtain cash for it at the rate of 3s. 9d. per 1000 cubic feet. Now, I need hardly say that this rate is so extremely low that no one looking out for a profitable investment of new capital is likely to be tempted to enter into competition with us. On the other hand, we must not conceal from ourselves the fact that in many continental towns there is a great desire to have gas-works of their own. A mayor or burgomaster may not unreasonably expect to add to his reputation or increase his popularity if he could be the party to establish gas-works for his constituents during the period of his presidency. Of course it would give to the municipality a large amount of temporary influence and patronage, but the question whether or not such works would ultimately turn out for the benefit of the town is a matter which requires to be very carefully considered and deliberated upon. At the last half-yearly meeting, in addition to the amount set apart for dividend, the sum of £56,000 was reserved for extensions. Of that sum we have spent about £6600 in the purchase of land at some of our works, and we have expended upon mains from £14,000 to £16,000. When you remember the fact stated in the report, that we have 1100 miles of mains, you may readily perceive that it requires a large continuous outlay to keep them in good repair, and to provide for their necessary extension whenever new houses are built. In addition to this, we have constructed some extensive works at Lille, which were imperatively called for by the fact which has often been mentioned here, that when the old fortifications were destroyed the part occupied by the ramparts was converted into building land, and a considerable space beyond has become part of the city of Lille, in every portion of which a supply of gas has been required. As to our mortgage debt, I may mention that in the year 1869 it was about £120,000, since which year it has been from time to time reduced, till now it stands at £68,000. During the last year we reduced it to the extent of £26,000. Under all these circumstances, I think I may fairly offer to you, and claim from you, mutual congratulations on the present position of the affairs of the association. There is one matter which occasions us considerable regret to-day, and that is that we do not see in this room a face which is very familiar to us all, and which is always welcomed with satisfaction—I refer to our esteemed friend Mr. Drory. A few weeks ago he paid a visit to Vienna, and while there the weather was very unfavourable and he succumbed to its bad influence, so that instead of being able to give that active supervision to things there which he is accustomed to give, he was obliged to remain several days confined to his room, and was at length advised by his medical attendant to leave the city as soon as he possibly could be removed. I am happy to say he is now much better, but his doctor told him that if he came over here he would be running a risk which it was not prudent to incur. We hope, however, in a fortnight or three weeks to see him in London, and have his advice on several matters which are now before us for consideration. I do not know that the board is in possession of any further information which it would be important or interesting to communicate, and I will therefore proceed to move—"That the report upon the affairs of the association now read be received, adopted, and entered upon the minutes."

Mr. VIVIAN seconded the motion.

Mr. BARBER: I think it is only due to the chairman and directors of the association that we should express our acquiescence in the congratulations which have been offered in reference to the progress of our affairs. In looking back for the last seven years, I see that there has been an increase in the profits every year. After payment of the dividend recommended to day, I understand there will be a large surplus to meet the necessary outlay on works and other matters. I wish to point this out for a special purpose. When our shares were divided, one-half of those shares—the new half—were written up to the extent of £43 15s. per share, and the amount was debited to the fund formed by the sums annually set aside for contingencies. And I wish it to be clearly understood that if the fund formed by similar appropriations since the creation of the new shares could be applied in a similar manner, the £6 5s. which remains uncalled on all our shares might now be written up in full. It may not be

right at the present moment, and under the present circumstances of gas supply and manufacture, to press this matter at all strongly, but it would be satisfactory, perhaps, if the chairman would kindly say whether the point has received the attention of the board.

The CHAIRMAN: The board have given their very serious attention to the point raised by the honourable proprietor, and they are most anxious to write up the sum still remaining on the shares, whenever they think it would be desirable to adopt such a course. It is really more a matter of account than anything else, nevertheless the directors have felt some degree of reluctance to do it without having a better founded hope than they have at present of making some increase upon the dividend, and with coal at 35s. or 40s. per ton at Vienna they are afraid to hold out any sanguine anticipations on that subject.

The motion was put, and carried unanimously.

The CHAIRMAN moved—"That a dividend of £2 per share be declared upon the shares of the association for the half year ended the 31st of December last, and that the said dividend be payable, free of income-tax, on and after the 15th of June next."

The motion was seconded by Mr. TURNER, and carried unanimously.

The retiring directors and auditor were also unanimously re-elected.

Mr. F. BASSETT: I beg to move—"That the cordial thanks of the meeting be given to the president and directors for their able management of the affairs of the association, and to the chairman for his conduct in the chair this day."

Mr. VIVIAN seconded the motion, which was carried by acclamation.

The CHAIRMAN: Gentlemen, on behalf of our revered president and for my brother directors and myself I thank you for this expression of your approval, and beg to assure you that we shall not remit our exertions for the benefit of the association. But you all know that our exertions in London would be of little avail were it not for the zealous support and assistance we receive from our excellent friend Mr. Drory and all our officers abroad. It will, therefore, give your directors great pleasure if you adopt a resolution expressing your concurrence in this view, and I beg to move—"That the best thanks of the association be offered to Mr. Drory, the general superintendent, and the other officers of the association, for their continued attention to the duties which devolve upon them.

Sir M. MONTEFIORE: I have great pleasure in seconding the motion.

The resolution was cordially adopted, and the proceedings terminated.

BOLTON GAS COMPANY.

An Extraordinary Meeting of this Company was held on the 17th ult., according to the Standing Orders of Parliament, for the purpose of considering, and, if so determined, of approving of the corporation bill now before Parliament—Mr. T. MOSCROP in the chair.

The CLERK having read the notice convening the meeting,

The CHAIRMAN said: This is an extraordinary meeting, and unlike our ordinary meetings when we submit a balance-sheet to be approved and a dividend to be declared. We are met here for a special object, and the meeting is rather of a technical or formal character, and I do not think we shall detain you many minutes. But I think it is only fair to refresh your memories by just referring to the extraordinary meeting which was held on the 15th of January last, "for the purpose of considering the terms of the sale and transfer of the undertaking of the Bolton Gas Company to the Bolton Corporation, which terms have been sanctioned and approved by the council of the borough of Bolton, and have also been approved by the directors, and is submitted to the meeting for the purpose of passing such resolution thereupon as shall be considered desirable by the meeting." You will remember that at that meeting the law-clerk defined the terms, but I may as well, perhaps, just give you a slight *résumé* of the proceedings of that meeting, by which we shall have a clear and distinct knowledge of what we really are doing. The terms ran thus: The corporation to pay to the shareholders of the gas company now receiving a dividend of 10 per cent., free of income-tax, a perpetual annuity of equivalent amount for every share now paying such dividend; the corporation also to pay to the shareholders now receiving a dividend of 6½ per cent., free of income-tax, a perpetual annuity of equivalent amount for every share paying such dividend; the corporation to pay the shareholders a bonus of £2 for each share held, the same to be secured by mortgage of the corporation for seven years, at 4½ per cent. per annum; the annuities and interest to be paid half yearly. It will be in the recollection of most of you that the question was thoroughly ventilated, and after a pretty lengthy debate, a resolution was submitted for your approval by the directors, as follows:—"That the terms submitted to this meeting for the sale and transfer of the undertaking of this company to the Bolton Corporation, be, and the same are hereby sanctioned and approved, and that the directors be authorized and empowered to take all necessary measures for effectually carrying out the same, and for settling all details thereof, and all proper agreements to be passed under the common seals of the company and the corporation, and to see that proper clauses be inserted in the Bolton Corporation Bill in Parliament for obtaining the sanction of Parliament and to effectuate the same agreement." You are aware that resolution having been submitted to the meeting, was all but unanimously passed. The agreement in harmony with these terms was made out in conjunction with the town-clerk and the law-clerk to the company. Since then we have been to Parliament, and the bill, with very slight alterations—alterations which do not affect in the slightest the terms betwixt the corporation and ourselves, those remain intact—passed the committee of the House of Commons, and since then it has passed the third reading. As a matter of form, as I have already observed, under Lord Warncliffe's Act, it is essential that before the bill is introduced into the House of Lords, that what we passed at our last meeting in February should be now confirmed. The resolution therefore I have now to submit for your approval, gentlemen, reads thus:—That the same bill now submitted to you be and the same is hereby approved, and that the common seal of the company be affixed thereto." That is the resolution we have to pass this morning, and I now move it.

Mr. J. KNOWLES: I have great pleasure in seconding the resolution moved by the chairman. It is a pleasure to me to do so, as I have taken a rather prominent part in promoting this transfer of the works to the corporation. The facts are precisely the same as were laid before you at the meeting in January; therefore it needs few words from me to enable you to come to the same conclusion, I hope, as you did then. If you remember, we had a gentleman at the meeting who rather criticized, not to say condemned, the sale of these works, and, as far as his figures went, he showed very clearly the case of a bad bargain by the gas company's disposal of the works upon those terms. But I think he pretty nearly answered himself at the meeting; if he did not, the public answered him the following week, when the sale of shares took place at enhanced prices. I think we are satisfied, all of us, that we have not made such a bad bargain as was then represented.

The motion was then put, and carried unanimously.

A vote of thanks to the chairman, moved by Mr. MASON and seconded by Mr. S. N. BANCROFT, brought the meeting to a termination.

STAFFORDSHIRE POTTERIES WATER-WORKS COMPANY.

The Annual Meeting of the Shareholders was held on the 24th ult., at the Offices of the Company, Hanley. Mr. C. M. CAMPBELL presided.

The directors in their report congratulated the shareholders that notwithstanding an extraordinary expenditure, amounting to £563, they were in a position to recommend a dividend of 5½ per cent. The balance on the year amounted to £4813 1s. 2d., of which £4427 10s. would be absorbed by dividend, leaving a balance of £385 11s. 2d. to be carried forward. There had been a decrease in the rents for the year of £50 4s., which was accounted for partly by a more economical use of the water by manufacturers, and partly by the great rainfall last year; but on the other hand the general rental was increasing, the company having had applications during the past year for a supply of water to 1032 new houses, which would produce an annual rental of £385 11s. 6d. The extra supply of water which was and would be needed for a rapidly-increasing population had not escaped the directors attention, and they had now a scheme in hand by which, if carried out, they hoped to be able to accomplish this object, but of course it would be attended with a considerable outlay, to meet which it was proposed to raise additional capital by the issue of another series of new shares. The engineer (Mr. Elliot) reported the whole of the pumping-stations, reservoirs, and works generally to be in efficient working order. It had been necessary to put in a new boiler at Tunstall pumping-station, the old one being in a leaky and dangerous state; and in consequence of the culvert in the Meir tunnel giving in from the pressure of the trains passing on each side, earthenware pipes had been substituted for the brick culvert. The directors considered the time had arrived for the company to have the entire services of their engineer, and Mr. John Elliott (whose services, and those of his late father, they gratefully acknowledged), being unable to devote the whole of his time to the office, they had advertised for an engineer who would give his whole service to the company. The directors referred with profound regret to the lamented decease of Mr. George Baker, their late chairman, who had been from an early period ay energetic supporter of the company's best interests, and announced that then had selected Mr. Thomas Keeling to fill the vacant office.

The CHAIRMAN, in moving the adoption of the report, said he felt most deeply the very painful position in which both the directors and the shareholders had been placed by the sudden death of their new chairman (Mr. T. Keeling) on the previous day. Referring to the decrease in the water-rents, he said the more economical use by manufacturers was counterbalanced by the belief that the water which had been wasted on factories was being turned into its more legitimate course in supplying the social wants of the community, and in reality they had gained rather than lost. Having explained various items of expenditure including an increase in income-tax and local rates, over which the directors had no control; and £177 for law charges, of which £122 was expended in defence of an action brought by Miss Clewes for injury to the water-course supplying her dye-works, for which the company did not think themselves liable, the chairman briefly referred to the subject of providing for an increased supply of water, which was under the consideration of the directors, and to the proposed change in the engineering staff.

Mr. J. BAKER suggested that the directors should set aside a sum of money every year to meet contingencies, so that extraordinary expenses should not fall upon current income, and have to be met at the cost of dividend.

Mr. J. KNIGHT and Mr. C. ADAMS expressed their concurrence with this suggestion, and the CHAIRMAN said it should have the attention of the directors.

The report was adopted, and a dividend of 5½ per cent. declared.

Mr. Kirk was reappointed auditor (in Mr. T. Keeling's place), and Messrs. C. Keeling, R. Heath, and J. Bull were re-elected directors.

A vote of thanks to the directors for their services during the year was passed.

An Extraordinary Meeting was afterwards held, when a resolution was passed, authorizing the issue of new shares to the amount of £21,000, the CHAIRMAN stating that the capital of the company had been exhausted all but £253, against which there was a balance of £346 due to the treasurer.

THE GAS QUESTION AT SWANSEA.

In compliance with a numerously signed requisition presented to the mayor, a public meeting of ratepayers and consumers of gas was held in the Guildhall, Swansea, on Thursday, May 23.

The meeting was convened for the purpose of taking into consideration the excessive price charged by the Swansea Gaslight Company for the supply of gas to the corporation for lighting the public streets, and to private consumers, and also to consider the best means for obtaining a supply at a cheaper rate. The MAYOR presided, and stated that he had convened the present meeting in compliance with a numerously and respectably signed requisition.

Mr. MILLS said they were met to discuss the question of the price of gas; and there were two courses open to them—either to bring back the gas company, which had broken faith to a considerable extent with the public, to the paths of rectitude, or to strike out a path for themselves, and to save the gas company the trouble of doing that which they ought to have done long ago. It appeared to him almost impossible that the Local Board of Health could carry out those principles of economy which for the last few years he was glad to see had characterized their proceedings, unless they were assisted by every public body in the town. The price of gas for the past five years, previous to the recent rise, was out of all proportion to the cost of the materials used, or the return made therefrom. In the year 1868 the price of gas was 3s. 9d. per 1000 cubic feet—then it was reduced to 3s. 6d. per 1000 cubic feet, but it had always been a matter of surprise to him that the ratepayers and consumers had ever put up with such a price as 3s. 6d. per 1000 cubic feet. In the south of London, where coals were burdened with an additional duty of about 4s. per ton more than that paid in Swansea, the cost was only 3s. 2d. per 1000 cubic feet; and although he would probably be told that in the south of London there was a larger population, and consequently a larger return upon the outlay, yet it should be borne in mind that gas-making was an exceedingly profitable thing, everything used sold at a very high price, and if everything turned into the gas-mains was taken into account, then not only had the manufacture of gas cost nothing, but the gas company had been paid a shilling per 1000 cubic feet for making it. The way he accounted for it was this. On the 1st of June next the contract will expire for the supply of coal to the gas company at 4s. 6d. per ton, but that contract had been in force for several years; and if they now put the price under the new contract at 1s. per ton more, that would make 5s. 6d. per ton—so that the price of coke got from the coal would more than pay them. The products of the distillation of coal, besides that of gas, were two very important articles of commerce in constant demand, and fetching high prices—viz., coal tar, which is the basis of all the dies so extensively used for many purposes of commerce, and for which there is such a demand that it can scarcely be supplied, and ammonia which is so extensively used for manures and other purposes. The consequence of these articles being in such great demand, and realizing such high prices (he was speaking now more especially of the south of London) was that after making due allowance for all the substances used in the making of gas, and giving credit for the articles sold, that the gas which was actually turned into the main, cost the company only 1s. 8d. per 1000 cubic feet—that was putting down an unusually high price for making. Deducting the difference in the price of coal in Swansea as compared with the south of London, would leave the cost of the make of gas in Swansea at about 1s. per 1000 cubic feet; and he would put it to the meeting whether the difference between the 1s., the net cost of the make of gas, and the 3s. 6d., the selling price, was not so great as amply to recuperate the company for any outlay made, and give them a very handsome return. He believed that a monopoly in some things, if properly carried out, to be a very good thing, but it was not a good thing unless it provided for the exclusive benefit of those who supported it. Now, the gas company had a clause in their Act by which they compelled a consumer in the first place to pay a handsome deposit, which deposit was given back at the end of three years without any interest or profit

whatever, notwithstanding the gas company had in the meantime been using that deposit, and had made 10 per cent. profit thereon. He could certainly not understand how the ratepayers could have so long submitted to that abominable imposition, and had not long since raised their voices against it. If the gas company would deal fairly with the consumers and the public—if they would give a good light at a moderate price—they would not grumble at them; even if they paid the rates in advance, upon which the gas company made 10 per cent., and yet had a good article at a fair honest price, then they would not grumble. But it was not so. They were supplied with a very bad article at a high price, and when they grumbled at the quality of the gas they were told that they must give some functionary at the works six hours notice, so that the company could still be able to supply gas under the most favourable circumstances to themselves. He said it was most unfair and unjust, when they take into consideration that a large number of ratepayers and consumers had laid out a considerable sum of money in bringing the gas into their houses, on the faith of being dealt fairly with by the gas company when the mains, &c., were laid on, to be coolly told that they must pay a considerably enhanced price for the gas. It was just like a tenant who, having taken a house by verbal agreement, after having the rooms nicely papered, and just as he is getting nice and comfortable, has notice given him by the landlord that he must pay a very much higher rent. He did not think the gas company had acted fairly, and he would therefore move the following resolution—"That the increase in the price of gas of 3d. per 1000 feet on the first excessive charge, as compared with other towns, is by this meeting considered an attempt on the part of the Swansea Gaslight Company, as monopolists, to charge a higher price to the consumers than they are justified in doing.

Mr. CURNOW seconded the resolution, and contended that, when they looked at the lavish expenditure which had been made at the works, and considered that notwithstanding the gas company had still paid the highest dividends which the law allowed, it must be evident that the price of gas was very high. He thought that the dividends should have been first reduced to something like 5 per cent. before an advance was threatened; and if the gas company came forward and proved that they could not supply gas at a less figure, then the consumers would probably not complain. They had not, however, done so—they were determined to maintain their highest dividends and to keep up their expensive staff, and in order to do so persisted in raising the price; and such being the case he would heartily second the resolution.

Mr. HIGGINSON observed that notwithstanding what had been said by the preceding speakers, so strong a case had not been made out as might be. The gas company, like all other chartered companies, had been bound down by Act of Parliament not to divide more than 10 per cent.; and such being the case one would have thought that a liberal policy would have been the best course for them to have pursued under the circumstances. They all knew that the gas company had had for years past a balance which they did not know what to do with. They could not pay more than the dividends which they at present paid: and one would have thought there was only one other course open to them—viz., to reduce the price. He had long thought that the gas company would at least do that, but for reasons best known to themselves that was not even thought of. Instead of so doing they had expended the money on the works, and they and the very walls were the most splendid—should he say in Swansea?—not excluding that building in which they were assembled, or should he say the gaol, or the poor-house, was the most splendid architectural building which they had in the town? Even the very flagging in front had been done in the most princely munificence, such as could not be seen in London. Why, the paving-stones were some 7 feet or 8 feet long by 3 feet or 4 feet wide, and were it not that they were laid down in front of a dead wall they would simply be too good for anything, for they would not be able to be removed to get a gas-pipe or a sewerage pipe under them—so that they were too good for anything else but a gas-work. Well, notwithstanding the gas company had done that, he did not think that they would have been found fault with, although the expenses virtually had been borne by the Swansea gas consumers. Then again with respect to the extension of the gas-mains to the Mumbles. He did not suppose that the increased quantity of gas which was sold at the Mumbles paid 10 per cent. upon the outlay; and he should also doubt whether the gas extension to Sketty paid 10 per cent. either. Now, all those things must have been paid for out of the surplus profit; but having been done, what were they now going to do with the surplus profit in the future? There was nowhere else to go to. There were no further adornments he could conceive possible for the gas palace, unless they covered the gasometer with splendid Gothic architecture. Anything really practical, or useful, or ornamental he did not think could be done, and therefore they had nothing for it but to reduce the rates. The profits accumulated, and what could be done with them? The directors were in perfect distress to know what to do with these surplus profits, and the next thing must be to reduce the price, which he had been looking forward to for some time past. They had gone to the Mumbles unasked, but they certainly would not grumble at that—they had extended the mains to Sketty; but that, too, they would not grumble at, being content to give their neighbours the benefit of gas; but having done all these things, what else could they do with their constantly increasing surplus profits but to reduce the price? He should be very sorry to hear any suggestion made that they should have two gas companies fighting for 10 per cent. profit and digging up the streets; but it appeared there was power to do that, and without applying to Parliament. What he should like to see was that the corporation should make some fair terms with the gas company for the purchase of their works. He held that it should be the first principle of all municipal governments that the water-works and the gas-works should belong to the town. Such was the case in many large towns, and in Manchester the gas-works were a source of an immense revenue to the corporation. They in Swansea had the water-works, which were just beginning to pay 5 per cent.; but if they did not, the town should pay for it, and if it did, then the town ought to have the benefit. Let them insist, then, upon the town having the gas-works in their own hands, and then any surplus profit would go for the benefit of the town, either in the diminution of rates, the improvement of the town, or reduction of gas-rents. Whichever way the surplus profits were spent, it came to the same thing.

Alderman JENKINS said he came to the meeting that evening more for the sake of hearing what the gas consumers of the town had to say with reference to the unjust increase which had been imposed on them by the gas company than with any intention of speaking on the subject himself. He had expressed his own opinion on several occasions at the council board as they had no doubt seen from the reports in the papers. When the first intimation of an advance was given to the corporation, they lost no time in putting themselves into communication with the gas company, and asking them to reconsider their determination. They pointed out to them that they were taking an undue advantage of the monopoly which they had in the town, and that if they persisted the result would be that the ratepayers would feel the burden to be so heavy that they would endeavour to induce another company to come to the town and compete with them. It was a question whether there was a sufficient field here for two companies; but he (Mr. Jenkins) felt very strongly that unless the gas company would meet them on fairer terms than they had hitherto done, the corporation, as representatives of the people, ought to pledge themselves to assist any new company which would come forward. The members, with very few exceptions, had pledged themselves to give all the assistance they could to such a company, and they had the undoubted right of laying down pipes, making gas-works, breaking up the streets, and doing everything else which was necessary. They had also advertised in the papers for the supply of gas for a settled period of not less than ten years. Offers had been made to them to supply gas at 1s. 10d. per 1000 in mains to be laid down by the corporation. That offer unfortunately had been made at a time when iron had reached a higher price than it ever attained before, and consequently the corporation could not avail themelves of it without putting the ratepayers to a greater expense than that to which they were subject at present. A special committee appointed by the corporation, went into the question very carefully. He had, however, unfortunately forgotten to bring with him the paper containing the exact figures, but speaking from memory, he thought the cost which would be necessitated by such a course would be about £18,000, the price of pipes being 75 per cent. higher than it was two years ago. If they had had the offer previous to the rise, they could have availed themselves of it, and obtained gas at the same price which was paid in Cardiff. It was a mystery to him, as well as to other members of the corporation, why they in Swansea should be called on to pay so much more than the people of the neighbouring towns. He had from the first maintained that they were quite as favourably situated in respect of the coal supply as Cardiff, and he was borne out in that opinion by gentlemen whom he saw sitting round that table. He saw several of the largest shippers present, and one of them had expressed the opinion at the council board that coal could be supplied at Swansea rather under the price at which it could be supplied in Cardiff, and therefore he could see no reason why the price of gas should be greater in the former town than the latter. It was this fact, that without any visible reason, they were made to pay more than Cardiff, which had "riled" the corporation and induced them to move in the matter as they had done, feeling as they did that the gas company were taking an unfair advantage of them. He believed the gas company overlooked at the time the fact that the board could make their own gas without going for an Act of Parliament. They talked so much about their rights that it seemed as though they really believed that it was impossible for any one else to come in and make gas in the town but themselves. Indeed some of the shareholders to whom he had spoken on the subject told him that the chairman of the company had said that the local board might talk as much as they liked, but that when it came to the question of getting an Act, they would meet with such opposition as would frighten the promoters of any public company who should endeavour to get a gas bill. Fortunately the local board had the power in their own hands already; they need not go to Parliament at all. The chairman of the company in his recent speech to the shareholders referred to the local board as having compelled them to extend their mains to Morriston and the Mumbles. Now they had had nothing to do with compelling or inducing them to go to the Mumbles. The reason why they did so was best known to themselves. Perhaps one reason was that they rather wanted to have something to do with new works, because he was informed new works were very beneficial to some people connected with the gas-works. But the principal reason, he believed, was that they had such an amount of surplus capital that they really did not know what to do with it. During the very time that the Swansea Company had raised their charge, two companies—the South Metropolitan and the Plymouth—had reduced their charges, the former by 2d., and the latter by 3d. per 1000—the South Metropolitan now charging only 3s., and the Plymouth only 2s. 6d. per 1000. It would be for the meeting to say what action they would take in the matter. If the gas company would meet them fairly, there would be no necessity for the local board to take action; if they did not, he thought it would be advisable for the inhabitants of the town, and possibly for the Local Board of Health, to purchase the works and carry them on for the benefit of the public. He was glad to hear at the recent meeting of the board that the capital of the company was only £56,000; upon that, with judicious management, the profit ought to be something handsome, and if the works were in the hands of a new company who would be satisfied with a less dividend, or in those of the local board, who would work them for the benefit of the public, he had no doubt they would be able to supply gas equally as cheap as the South Metropolitan, if not as cheap as Plymouth.

Mr. ROGERS said he had had the misfortune to differ from the majority of the corporation on the question of the supply of gas. It must not be supposed for a moment that he would not hail with pleasure the news that the price of gas was to be reduced instead of being increased; but at the same time he thought it was only fair that both sides of the question should be candidly stated, and that statements should not be made to the public which were calculated to mislead. He thought it was only fair to give the gas company the benefit of the doubt. All commodities had risen in price during the last couple of years, and notably within the last twelve months. Coal had risen to a fabulous price. As Alderman Jenkins had just said, iron was higher than it had ever been before—of course he meant in modern times, as it had been much higher. Now all this told in the manufacture of so important an article as gas for public consumption. The price of coal and of labour had affected, and would continue to affect, the Swansea Gas Company to a most material extent. The products of distillation of coal, to which Mr. Mill had alluded, were certainly not so valuable in this part of the country as in London—as ammoniacal liquor and coal tar were but little used here. There was a fallacy also in what Mr. Mill had said with respect to the price of coke. Although 3½ tons of coal would produce 2 of coke, still half of the coke produced was used under the retorts at the gas-works to distil the gas, so that they had only one ton of coke for sale out of every 3½ tons of coal. At the discussion upon this question, which took place recently in the Council Chamber, he (Mr. Rogers) had endeavoured to show that although the price of coke—that is of gas coke—had risen from 8s. to 14s. a ton, this bore only a comparatively small proportion to the advance in the price of coal. It was all very well for gentlemen to say that coal in Swansea stands on a par with coal in Cardiff and London. It was not so. The price of local coal for gas-producing purposes was, he was informed, from 15s. to 16s. per ton, with a small amount to be added for conveyance to the works. But in order to bring the gas to the proper illuminating power it was necessary to add to the local coal 10 per cent. of cannel coal, which added very considerably to the expense, and raised it rather above the price of coal of equal quality for gas-producing purposes in Cardiff. And while he was on the subject, he might incidentally mention—as showing the foresight of the corporation in times past—that they agreed with the gas company to withdraw their opposition to their bill on condition, among other things, that they would supply gas of an illuminating power equal to 11 sperm candles. If the gas company had adhered to that point, the public would have good cause to be thoroughly disgusted with the quality of the gas supplied, as a large quantity would have to pass through the burner in order to give anything like a reasonable light. But though not bound to do so, the gas company actually supplied gas equal to 15 sperm candles, which, he was informed, though he did not vouch for it, represented an additional expense to the company of 1s. per 1000 feet. He knew that, in speaking as he had, he had not taken the popular side, but he was actuated by the wish to give fair play to the gentlemen who had embarked their capital in the gas-works.

Mr. MOXHAM thought Mr. Rogers had forgotten one very important matter—viz., that if coal had advanced in price in Swansea, it had also increased in Cardiff and other towns, and therefore it was not easy to see why the price of gas should have been raised in the one case and not in the other. But further than this—as Alderman Jenkins had said—the Plymouth and the South Metropolitan Companies had actually reduced the price of gas within the past four months, notwithstanding that the price of coal, materials, and labour was going up day by day. He had been informed that the local coal known as Hughes's Vein, produced 9000 feet of gas per ton; if this were so, it gave a great advantage to the Swansea Company as compared with the Cardiff, as the latter could not get coal of equal quality for gas-producing purposes at anything like the

price. The question really before the meeting was this: did the ratepayers wish the corporation to continue their efforts to induce the gas company to reduce the price of gas to the old rate of 3s. 6d. per 1000, or did they wish them to assist a competing company?

Mr. LIVINGSTON said he came there that evening for the express purpose of hearing what the ratepayers had to say on this question. Some of those then present, who represented the ratepayers at the council, had an opportunity of giving expression to their opinions in another place, which were brought before the public through the medium of the press, and he thought it was desirable that those who were not in this position should be the chief speakers on occasions like the present. He was very sorry to say that the information he had hoped to have had at that meeting had not been forthcoming. He could not himself conceive that the gas company of Swansea could muster audacity enough to come to the ratepayers and ask them to pay a price for gas which the ratepayers as well as the gas company themselves knew to be unjust. He should therefore very much like, if some arrangements could be come to, fairly to test the point, and see whether it was possible, with coal and material at their present prices, to supply gas at a lower figure than was charged by the gas company. If, having made such an inquiry, it should be found that the gas company—taking advantage of the position they held of having a pure monopoly in the place—meant to saddle the public with charges for gas which were unjust in comparison with other towns, then the corporation, backed up by the ratepayers, ought to say, "You shall not do it. We will give you the opportunity of supplying the town at a fair price, if you please; and if you will not do so, we will, with the support of the ratepayers, establish a company, or help a company to establish themselves, so that the people of Swansea may not be imposed upon by you or anybody else." He did not say that the gas company were imposing on the public—he did not think they were; he was not in a position to say so—as no information had been given to the council as to whether the company were really paying for the coal more than they paid 12 months ago. Some people said they were, others said they were not; and he did not know which statement was correct. But there was one difficulty in his mind which had not been satisfactorily cleared up by his friend Mr. Rogers—though he was generally very lucid in the matter of figures—and that was that it had never been explained to him why they in Swansea were not in a position to obtain gas at as low a price as the people of Cardiff. It was a fact—at least he had been told so by those who ought to know—that whether the local coal was fit for making gas or not, the gas company had been supplying the town with gas which was made out of that coal; and he did not know that even at the present moment they were paying for it the high prices which Mr. Rogers had mentioned. One of their most important shareholders had told him the other day that they had very advantageous contracts in the immediate locality, of which they had had the full benefit, and he (Mr. Livingston) was very sorry that, rather than meet the public fairly as they ought to do—seeing what a grand pull they had had out of them in times past, and without waiting awhile to see whether the price of coal would not go down—they should have so suddenly and imperatively raised the price, and endeavoured to wring as much out of the public as possible.

Mr. YEO said the gas company had shown undue haste in raising the price of gas. But he wished he could as confidently express an opinion with respect to the validity of some of the figures which had been placed before them that evening. He should be glad to be satisfied that the gas company were really only paying for their coal at the price of 4s. 6d. per ton—if it were so he could only say they were very fortunate, and he should very much like to have their contract. When he told the meeting that the firm with which he was connected were with two exceptions—viz., the town and the railway—the largest consumers of gas in Swansea, and that their gas bill amounted to about £400 a year—they would not suspect him of any wish to keep up the price of gas; but he must say that he feared they would have great difficulty in establishing new works in the town, and that he felt that a little undue colouring had been given to the statements on the other side of the subject. He quite agreed with what he understood to be Mr. Livingston's suggestion—namely, the desirability of calling in some competent authority, who, after taking all the circumstances into consideration and making himself acquainted with all the facts of the case should give his opinion as to the possibility of manufacturing gas at a lower price than was charged by the gas company. If such an opinion were given, they would be able, fairly and confidently, to adopt one or two alternatives—either force the gas company to come to what was found to be a fair and reasonable price, or establish a company so that they might get it at that price themselves. He wished it to be known that he was not one of the shippers who were said to have expressed the opinion that the Swansea Gas Company were in a better position as regarded the sources of supply than the Cardiff Company; his opinion was that it was rather the other way. All he could say was that he should be heartily glad to see a reduction in the price of gas, and he repeated that he thought the company had shown undue haste in raising the price; he thought it would be a gracious act if they were even now to withdraw the advance and say, "We will try for six months and dip a little into our dividend of 10 per cent, before we come down on the ratepayers." He had been informed by a gentleman whom he had happened to meet that evening that the gas company were entitled, under the provisions of their Act of Parliament, to have a sum of £10,000 as a reserve, but that at this moment their reserve-fund was only £2800, and that they had been obliged to trench upon it for some time past in order to keep up their dividends of 10 per cent. He gave the statement for what it was worth—he had received it from a gentleman who he believed was an authority.

The MAYOR said he was not a very large consumer of gas, but he must say he was sorry that the gas company should have put up the price so abruptly and without giving them a little breathing time. It was true they had gone on for five months without making a Local Board of Health rate, and perhaps the gas company thought that this being so, they could afford to pay something extra in the price of gas. He hoped they would reconsider the question and reduce the price of gas even though it should be necessary for them to trench a little upon the £2000 reserve. He then put the question, and it was carried unanimously and amid loud applause.

On the motion of Mr. JOHN IVOR EVANS seconded by Mr. TATE, a cordial vote of thanks was passed by acclamation to the mayor, and the proceedings terminated.

ON A NEW MODE OF DEALING WITH SEWAGE PRECIPITATES.

By Major-General H. Y. D. SCOTT, C.B.

[Paper read before the Society of Arts.]

No class of doctors have differed more than sewage doctors, and the class has been recruited from widely different professions. Civil engineers, farmers, chemists, medical men, and clergymen, have all had their nostrums, and each sewage doctor has thought his neighbour a quack. At length, however, there appear signs of meekness in the opposing ranks, and the sober-minded of each party, whether filtrationists, precipitationists, irrigationists, or disinfectionists, are listening with more attention to the views of their opponents, and beginning to conceive it possible that their own systems might receive aid from the adoption of portions, at least, of some of their enemies schemes. The following propositions will not, I believe, be contradicted now by any but enthusiasts:—

1. Though there are many cases in which the dry earth and analogous systems may be usefully employed, such systems are better adapted to country than to town life.

2. Large communities congregated in cities, and accustomed to the convenience and cleanliness of water-closets, will not abandon the luxury, if they can by any means retain it.

3. If the excreta could be disposed of by a dry-earth system of disinfection, the animal and vegetable matter, *e.g.*, cabbage water, the scourings of plates and dishes, and all the other impurities arising from the domestic operations of daily life, must be removed by water, and the water so used must be purified before it is allowed to run into our streams and rivers.

4. For the final purification of contaminated water, no artificial process, whether chemical or mechanical, can compare with filtration through a considerable depth of soil and of wide extent as compared with the water to be dealt with.

5. However valuable sewage may be to the farmer at such times as he may want it, if he be obliged to take it at all seasons, he will prefer being without it.

6. Whether sewage is to be utilized for purposes of irrigation or to be simply cleansed by filtration, it is advantageous to remove the fecal matters, either by subsidence, by filtration, or by precipitation, or by a combination of these methods.

7. Sewage is a comparatively harmless and inoffensive compound when fresh, but becomes highly offensive and deleterious when it has undergone putrefaction.

8. Putrefaction is greatly encouraged by the presence in the sewage-water of fecal matters, and their removal is, therefore, an important object, independently of the irrigation question.

9. The fecal matters of sewage have very little value as fertilisers, and in rare cases only can repay the cost of collection and distribution for agricultural purposes.

10. Such fecal matters cannot be collected and removed without creating a nuisance, unless they are previously treated with a considerable portion of deodorising substances.

The use of water, then, would appear to be a necessary evil; and if it be granted that the civilized being will prefer taking the chance of poisoning his neighbour who lives lower down the stream to having his own senses of sight, or smell, or his sentiment outraged, which would appear, by the frequency of injunctions, to be sufficiently proved; and if it is hopeless to inoculate the Englishman with the careful practice of the Chinese in respect of his excreta, it behoves us at once to endeavour to reduce the nuisance of water carriage to a minimum.

The proposal which I have to lay before you this evening is an effort in this direction. My scheme makes no claim to the complete purification of sewage-water, or to supersede irrigation or filtration, when these processes can be carried out, nor does it pretend to extract from the water those highly fertilizing but soluble substances which are known to exist in sewage. It aims simply at removing from it the fecal matters (which are injurious, whatever the destination of the sewage) by the cheapest possible precipitants, and subsequently converting what has proved worthless, as hitherto dealt with, into a marketable substance.

In all the schemes proposed for dealing with the deposit of sewage, the one idea hitherto has been to convert it into manure. The chemist may have demonstrated that the fertilizing ingredients of the deposit are in themselves almost valueless, owing to their being necessarily laden with an immense proportion of worthless matter. He may have shown that the deposit, though it may have increased value given to it by the introduction of fertilizers, gains its improvement in a very wasteful manner; but the idea still holds its ground, and within the last few days another sewage manure scheme has been announced to the public.

As early as 1861, the Sewage of Towns Commissioners stated that, "the the value of the solid portions of sewage being small, all attempts at realizing profits from its preparation have signally failed;" and, in 1870, their successors, the Rivers Pollution Commissioners, express a similar opinion. They tell us that, "experience has warned the manufacturer of these feeble manures that the value indicated by chemical analysis cannot be counted on in the market." Dr. Odling speaks of another sewage manure as "so extremely poor." Kropp says, "These instances are enough to prove that solids extracted from fluid sewage cannot be manufactured into dry manure so as to pay for the trouble;" and Mr. Corfield, the author of the "Treatment and Utilization of Sewage," gives his testimony that "the manures that they produce are in every case very inferior, as may be expected from the known value of the sewage constituents that can be precipitated." Nevertheless, sewage manure schemes prosper, showing this—if they show nothing more—that the object aimed at—viz., the satisfactory utilization of sewage slush is one of the utmost importance to the community, and this must be my apology for bringing my own scheme before you this evening.

It must be conceded that the plan for dealing with the question which I am about to propose will, at first sight, appear even less calculated than the manure schemes to accomplish the desired object; but a very small amount of chemical knowledge, and a few words of explanation, will render the reasonableness of the process evident, and remove any objection which ignorance may raise to the employment of a material so prepared.

Before entering, however, upon the explanation of the process, I desire to call your attention to one feature of my plan of dealing with sewage, not necessary to the successful treatment of the sludge, but conducive to good results, and highly desirable from a sanitary point of view.

The attention of the public was forcibly called, towards the end of last year, to the evil results which may arise from the escape into our houses of sewer gases, generated by the decomposition of the organic matter in sewage; and any method which would tend to lessen the probabilities of the danger which the nation then incurred from this cause is well worthy of its attention.

In the precipitation of sewage, and for its deodorization, it has been the practice always to introduce the necessary chemicals at or near the depositing tanks, and to employ mixing machinery to agitate the chemicals with the sewage water to be operated upon. However perfect such machinery may be, the mixture, when large bodies of fluid are present, remains incomplete, and much of the material introduced passes off in the effluent water without doing its work. To obviate this I have introduced the chemicals at a point of the sewer at a long distance from the outfall, and have taken advantage of of the motion of the water to procure their thorough admixture with the sewage.

The first impression, when such a plan is proposed, is that the precipitation will take place in the sewer, and that an accumulation in the bottom of the drain of the precipitated matters must result; but this is not the case. On the contrary, the slimy glutinous nature of untreated sewage is destroyed by the precipitation, and in lieu of the slime we obtain a sort of curdling, and a multitude of small floating particles are produced, which actually clean and scour the drain instead of choking it. Thus it follows that no fecal matter is left to fester and putrify on the sides and bottoms of the sewers, and the whole of the sewage is delivered at the outfall in a fresh condition, deodorized in the most effectual manner which the chemical employed can bring about. At Ealing, where this system is being carried out by my brother, Mr. T. W. Scott, subject to the supervision of Mr. C. Jones, the engineer of the Local Board, the results are very striking. The sewerage has two main branches, one from the railway station end of the village, the other from Ealing Dean, and the lime is introduced in the former one at a distance of three minutes' walk from the station and twenty minutes walk from the tanks. In this branch the drain is clean throughout; from the Ealing Dean sewer, with each flooding from heavy rains, we get down a quantity of decomposing sewage, and the drain is found to be greasy, slimy, and coated with black deposit. Moreover, in the first drain,

the formation of sewer gases being arrested by the rapid removal of matters which might otherwise putrefy, the atmosphere of the drains is found to be so inoffensive as to occasion little annoyance to the workmen who visit them. The importance of these results cannot be over-rated, and this mode of introducing the chemicals has no less an authority in its favour than that of the President of the Civil Engineers, who recommends its adoption for Birmingham.

All processes for the precipitation of sewage depend for their efficiency upon a very simple action. Sewage, as has been said, is slimy and glutinous. Though the grosser particles in the liquid will subside on standing, the liquid will not clear itself unless a coagulation is produced in it which can lay hold of the solid suspended matters. The effect of adding chemicals which will unite with some substance in the fluid, or with each other, is to produce this coagulation. It thus happens that, with the mineral matter so formed, the whole of the fecal matters are entangled and subside, leaving the liquid more or less colourless and bright. These fecal matters consist in large part of organic compounds, which, when dried and distilled, yield great quantities of inflammable gases. In India, indeed, they have been used for illuminating purposes. The dried slush will burn freely when collected in some quantity. This fuel plays an important part in my process, as will hereafter appear.

Various methods have been employed for the precipitation of sewage, and the mere enumeration of them would occupy more time than we have at our disposal. Many of them clarify and deodorize the sewage in a very satisfactory manner, but the expense of the chemicals necessary, and the worthlessness of the products obtained, have been a bar to their successful application. They have, consequently, one after the other, been abandoned, and have often been pronounced unsatisfactory, owing to the economical views of the governing bodies of the places which have tried them, and which have led to such a reduction of the chemicals used as entirely to vitiate the process. It is manifestly therefore of importance that the chemicals employed should be of the cheapest possible description; for in proportion to their value will be the likelihood of the recurrence of such economy when the slightest difficulty or delay arises in the advantageous disposal of the product; and this difficulty has been one of the worst drawbacks to every process yet tried. Of all the precipitating ingredients yet employed, lime has proved the simplest in application, and least costly. Dr. Letheby, writing in the medical press, observes on it:—"In a sanitary point of view, the careful precipitation of sewage with lime has undoubtedly been very successful, although it has not been found a success commercially; for the precipitate is chiefly composed of carbonate of lime and non-nitrogenous organic matter." Wherever, indeed, this process has been fairly tried, a remarkable improvement of the neighbouring streams has taken place. "The Tottenham Local Board of Health," says Dr. Letheby, "were so pleased with the process, that in the early part of 1857 they published a testimonial to the effect that Mr. Higgs was treating in a most satisfactory manner the sewage of from thirty to forty miles of sewers, and discharging the supernatant water in a comparatively pure state into the river Lea, so that the board were thus enabled to sewer and drain their populous district without annoyance to any one. At Leicester, also, in 1858, three years after Mr. Wicksteed's works had been established, the river Soar had become changed from a most foul and pestilential stream into a comparatively pure river, for before the sewage was purified by Mr. Wicksteed's (lime) process, the water of the river was black with decomposition, all the fish and aquatic plants had been killed, and persons exposed to its influence were constantly ill. At the Belgravia Mill, which is just below the point where the sewage enters the river, the foulness of the stream was such that in summer time the water of the mill-dam appeared to boil with putrefaction, and the stench was intolerable. So large indeed was the quantity of sulphuretted hydrogen evolved from the water, that the silver in the men's pockets turned black in a few hours, and, as might be expected, those who worked at the mill were constantly affected with diarrhœa, and rapidly fell off in health. One man only, out of thirty, in eighteen years, had been able to withstand the effects of the effluvium, and he it was who gave us an account of the matter. But soon after the lime process had been adopted, the river presented an entirely different appearance, for aquatic plants had begun to flourish, the fish had returned, the black mud had ceased to accumulate, and the mill-dam was no longer offensive. All along the stream the people spoke of the change with satisfaction, for the process had evidently fulfilled the requirements of the local Act of Parliament, which demands that the sewage water discharged into the river from the works shall not occasion a nuisance, or be injurious to the health of those who live or are employed upon the banks of the stream." Dr. Letheby goes on to say:—"At first the patentees of this process were so sanguine of commercial success, and entertained such extravagant opinions of the fertilizing power of the dried sewage precipitate, which they called "sewage guano," that great and unnecessary expense was encountered in the construction of the works at Tottenham and Leicester. They were built, in fact, with a view to commercial profit rather than for sanitary purposes; and, therefore, as soon as it was found, from experience, that the manufactured product had little or no agricultural value, and that the undertaking was unprofitable, the works were abandoned by the patentees and transferred to the local authorities. In the case of Tottenham, the machinery and plant, erected at great cost by Mr. Higgs, was purchased at an almost nominal price by the local board, who could, therefore, well have afforded to use their property for sanitary purposes; but instead of this, although ample proof had been afforded of their sanitary capabilities (as witnessed by the testimony of the board to Mr. Higgs in the month of February, 1857), yet they were so neglected and improperly managed as to have become at last a mere pretence of the objects for which they were designed and employed. The contrast, indeed, between the condition of things in 1857, as described in the testimonial of the board, and subsequently, was most marked; for at that time—to use the language of the testimonial—the supernatant water was discharged in a comparatively pure state into the river, so that the board by these means was able satisfactorily to sewer and drain their populous district, and dispose of the sewage without annoyance to any one. Almost as soon, however, as the works had passed into the hands of the local authority, the process was so imperfectly conducted that the trustees of the river Lea were obliged to commence legal proceedings, on account of the pollution of the river and the nuisance created by the discharge of foul, undefecated sewage from the works, and this at last became so serious that an injunction was obtained to prohibit the offensive practice of the board."

Dr. Letheby then states that at Leicester also the process had recently been seriously neglected, and that at the time of a visit which he had paid to the works *the estimated quantity of lime necessary was not being used*, and the river was fast returning to the unwholesome condition in which it was before Mr. Wicksteed established his works. The annual cost of conducting the works being £1400, and the sale of the manure amounting only to £400, the loss had led to greater and greater neglect in the conduct of the works, and, as Dr. Letheby adds, "it is not unlikely that the foul condition of the river may be wrongly attributed to a failure of the lime process *per se*, rather than to the carelessness and false economy of those who have had the management of it."

The precipitation of sewage by lime, however, has been generally regarded by chemists as satisfactory, whenever a sufficiency of lime for the purpose has been employed. Dr. Hofmann, Mr. Witt, Dr. Clark, Dr. Crace Calvert, Mr. Versmann, Dr. Frankland, Dr. Odling, Dr. Angus Smith, Mr. Aiken, Dr. Alfred S. Taylor, Dr. Normandy, and Dr. Miller, have all testified to its efficiency when fairly used; and wherever it has failed, the failure, as Dr. Letheby says, is entirely due to the carelessness and parsimony of those who have hitherto had the management of the process. Lime is one of the principal precipitating ingredients of both the phosphate and sulphate of alumina systems.

At the commencement of my paper, I suggested that the civilized being preferred taking the chance of poisoning his neighbour who lived below him on the river, to having his own senses of sight, or smell, or his sentiment, outraged; and I might with equal truth have added that the philanthropy of local boards and other parish authorities begins and ends at home. A measure which would, for the benefit of other communities, tax the ratepayers who elect them, can never find favour with such bodies, and amongst the evils of the water carriage is the facility which it gives for transferring the whole of one's own nastiness to the dwelling of one's neighbours. Even that great and good man, Dr. Johnson, could not resist the temptation of throwing the snails he found in his own garden into the garden adjoining, and it is improbable that any place in the kingdom will be found sufficiently unselfish to tax itself for the sake of the health and comfort of the next parish. Injunction and compulsion are the only remedies available.

In such matters, however, the probable influences of parsimony on the success of a process ought not to be neglected, and it is among the advantages of the process I am proceeding to describe to you, that the materials employed are not only the cheapest available for the purpose, but for the particular object to which I apply them no saving is effected by scamping their use.

We owe the lime process to a treatment for softening and purifying water patented by Dr. Clark, in 1841. He showed that carbonate of lime, being to some considerable extent soluble in solution of carbonic acid gas, and scarcely so in pure water, it was only necessary to add to water thus impregnated a sufficiency of quicklime, to combine with the free carbonic acid gas, in order to precipitate both the dissolved carbonate of lime and that which is formed by the combination of the quicklime added and such carbonic acid. It was also found, in the application of this process, that the precipitate thus produced removed from the water a notable quantity of dissolved organic matter, as well as impurities held in suspension, and hence its great value as a precipitant of sewage. Now, a much smaller amount of lime than is sufficient to throw out of solution all the carbonate of lime present will suffice to produce clarification after standing. There are phosphoric acid and various fatty acids, besides carbonic acid, present in the sewage water, which will produce precipitates with lime; and, until the carbonic acid is saturated, each quantum of lime added will produce a double quantity of lime in the deposit, by throwing out, as has been said, not only the carbonate of lime in solution, but also the introduced lime, by its combination with the carbonic acid, which up to the period of this addition held the carbonate of lime in solution as a bicarbonate. Consequently, if the mineral deposit thrown down by the lime has any commercial value—and I hope to show you that, in the minds of those best capable of judging, it has—there is an economy in not being too niggardly in its use.

Another substance which has a recognized purifying and decolorizing action, and which is at the same time generally available, and of nominal cost, is clay. Clay has been used for defecating sewage, both in its ordinary conditions and partially dissolved in sulphuric acid. In the A B C process, out of 2581 parts by weight of precipitating compound, it is specified that 25 parts shall be burned clay, 1900 parts ordinary clay, and 600 parts of alum, of which alumina—an important ingredient of clay—forms part. Again, in the sulphate of alumina process, for every 100,000 gallons of sewage, Dr. Anderson used, according to Dr. Letheby, 9½ cwts. of sulphated material, compounded in the proportion of 1 part of common sulphuric acid to 2 parts of ordinary clay mixed with its own bulk of water; and, in some form or other, clay is an ingredient specified in many other sewage processes. In fact it is a well-recognized fact that alumina and oxide of iron, even in the condition in which they exist in common earth, have the power of absorbing noxious gases, fixing soluble organic matters, and of otherwise purifying sewage.

In lime and clay, then, we have these two substances readily obtainable everywhere—the one at little cost and the other at a nominal price—and well calculated for precipitating and defecating sewage. Moreover, those substances react on each other, and thereby increase the effect which each separately is capable of producing. Supposing we have finely divided clay suspended in pure water, the addition of lime will cause the particles of clay instantly to collect and precipitate. There is, in fact, considerable affinity between lime and clay.

It so happens that these ingredients, carbonate of lime (the substance precipitated on the addition of lime to ordinary sewage water) and clay, are the chief components of those limestones which yield on calcination hydraulic limes and hydraulic cements. This discovery was first made by Smeaton, the celebrated engineer, who says, "I have never found any limestone containing clay in a considerable quantity but what was good for water building."

Subsequently, Vicat determined the proportions of clay which it was necessary limestones should contain, in order to yield limes possessing in greater or less degree the property of setting in water. He found that limestones containing from 8 to 12 per cent. of clay yielded, on calcination, limes *feebly* hydraulic; that limestones containing from 15 to 18 per cent. yielded hydraulic limes; and those containing from 20 to 25 per cent. of clay yielded *eminently* hydraulic limes. Acting on these principles, Vicat established a factory at Meudon, near Paris, at which artificial limes are made by calcining mixtures of chalk (carbonate of lime) and clay in the proportions necessary to give the required results. In this country also, and abroad, the so-called Portland cement has been made by calcining at a high temperature 75 per cent. of chalk (or carbonate of lime ground to powder when chalk is not available) intimately mixed with 25 per cent. of clay. The process commences by triturating together in a wash mill chalk and clay in those proportions with a large quantity of water. From the chalk mill there if an overflow by which the water, which is constantly running into the wash mill, may pass off, carrying with it some of the chalk and clay in suspension. The milky fluid thus produced is allowed to run into large tanks or is pumped into them, the coarser particles being detained in the channels leading to the tanks by catch pits, or some other means. When the tanks are full, the solid matters are allowed to subside, the top water is drained off as far as possible, and the operation of running the mixture into the tanks is again commenced. As the matters in suspension do not very readily settle, the process of filling the tanks with the mixture is slow and tedious; owing, also, to the greater fineness of the division of the clay than can be produced by reducing chalk to a powder, there is a considerable tendency to separation between the chalk and the impalpable particles of clay, which is rectified as far as may be by subsequent admixture of the compounds, either in the process of removal for drying, or after the mixture has been burned to cement and ground to powder.

It will be readily seen that there must be a great similarity between the compound thus produced and that which results from introducing quicklime and clay, in the proper proportions, for cement or hydraulic lime, into a drain at some distance from the settling tanks, or into suitable mixing vessels, where the ingredients can be thoroughly incorporated with the sewage water and with each other.

The chief points of difference, which are entirely in favour of the sewage process, are:—

1. The more intimate mixture which can be brought out in the sewage

water, owing to the impalpable nature of the precipitate of carbonate of lime which takes place on the addition of the lime.

2. The more rapid settlement of the sewage precipitate than the mixture of chalk and clay.

3. The amount of organic matters which is carried down from the sewage with the carbonate of lime and clay, and which will serve for the fuel to burn the mixture to lime or cement.

The amount of fuel, indeed, which the slush will afford is so large, that in the absence of any better mode of getting rid of the nuisance, and in consequence of the loss which results from attempting to deal with it as a manure, it has been proposed to destroy it by burning it.

Mr. Thomas Hawksley, President of the Institute of Civil Engineers, for instance, gave in evidence, a week or two since, before the Committee of the House of Commons on the Birmingham Sewerage Bill, the opinion that, "it was practicable to burn the sludge, which contained a good deal of combustible matter;" and Mr. F. J. Bramwell, C.E., also gave evidence that "the sludge deposited at Saltley contains about 15 per cent. of solid matter, and of that 40 per cent. is combustible, and therefore could be used as fuel." Professor Abel, one of the members of the Council of this Society, who has for many years given great attention to the question of limes and cements, after witnessing one of the earliest experiments, gave the points we have been considering careful attention, and arrived at the conclusion that the gain in lime and other mineral matters derived from the sewage water, the collection from the sewage of combustible matter required for the burning of the deposit into cement, and the thorough incorporation of the cement-producing materials, must combine to render the production of cement, through the agency of this method of sewage treatment, a profitable business in large towns.

After the mixture of the ingredients has been made, and the top water drained off, the subsequent operations are similar, whether the process is that ordinarily employed for making cement, or the one now proposed. In each case the mixture has to be dried, and this operation may be performed most readily on tiled floors, with heated flues beneath them, such as are used in the potteries for drying clay.

It might be supposed that the process of drying the sewage matters which are precipitated with the lime and clay would be a very disagreeable one, but it is not so. I here exhibit to you some of the deposit in question, a portion of which is also undergoing the drying process on the table, and you will find them quite inoffensive. Even after four months, we have found that the deposit is still without smell; and though the time of the year at which the experiment has been made may have been very favourable, yet it can hardly be doubted, that even in the heat of summer, the deposit would remain free from smell for some days, and it could be treated, if necessary, day by day. In order, however, that on so important a point as this you may have the fullest evidence, I will again refer you to that recently given before the Committee of the House on the Birmingham Sewerage Bill on this question. Dr. Voelcker, consulting chemist of the Royal Agricultural Society, stated:—"Experiments as to making cements from detritus according to General Scott's plan, are by no means a nuisance." "The suspended matters in sewage are always very offensive, and that is the reason why populations are so anxious to get rid of them. If they were allowed to accumulate, they would, of course, get into a state of putrefaction, but you can use chemical action upon them, and even when they accumulate for a certain time—by General Scott's plan, especially—they can be kept free from putrefaction." Dr. Frankland, Professor of Chemistry at the College of Chemistry, and one of the Rivers Pollution Commissioners, says of the lime and clay process of precipitation:—"The deposit, also, would be absolutely inodorous;" and Mr. F. J. Bramwell, C.E., states:—"No injury would be likely to arise in the way of nuisance from dealing with the sludge in the manner proposed."

Having cleared away, as I trust, any doubts you may have as to the inoffensiveness of the process of drying, I proceed to the last stage of the manufacture, in which also some very unfounded suspicions may naturally exist in the minds of those who have not had the advantage of that technical education concerning which so much is said and so little done. Before, however, taking up the question of calcination of the dried deposit, I ought to call your attention to the fact that in the dry condition the compound has by no means a disagreeable odour. I can hardly say of it, as it is said of the Chinese "tafo," a somewhat similar material, that it has the smell of violets, but I am quite certain that no one would have the least suspicion of its origin, either from its appearance or odour. Some visitors to the works, indeed, have pronounced that it has the smell of new bread; but I leave it to you to judge of this for yourselves. I have provided a small store of the compound for distribution. The compound may be either completely dried on the flues, or it may, when it has reached a certain consistency, be made into bricks and allowed to dry in the air, as has been done with the specimens which I have passed round for your examination. In this dry condition the deposit can be preserved for any time without creating the slightest nuisance, and it is hardly necessary to point out that, from the commercial point of view, it is of no small consequence that the raw material should be inexpensive, especially when it is possible that the finished manufacture may remain on hand for some time. To give an example of what I mean, I may explain to you that the deposit which they are now obtaining from the Leeds sewage is not being disposed of as it is produced, and, as I understand, it is the intention of the Native Guano Company to preserve it for twelve months, in order to improve its quality by fermentation. Now, the value of the materials required for precipitating 252,352 gallons is, according to the Rivers Pollution Commissioners, £1 18s. 5d., without assigning any value at all to the 1155 lbs. of clay used, and the 7 lbs. of blood, whereas the value of materials, including the clay, used in the cement process for the same quantity of water would not exceed, in the generality of cases, 4s. 6d., and could not in any place in the country exceed 7s. 6d.

On these data, a year's supply of chemicals at a place like Leeds would, in the A B C process, which is now being tried there on a portion of the sewage, cost upwards of £30,000 per annum. The supply of materials for the same period for the cement process would not exceed £6000 or £7000. I say nothing about the value of the manure resulting from the A B C process, or the cement produced by mine, the point to which I desire to draw your attention here being simply the amount of capital required for the purchase of the materials in the two cases.

For the phosphate of alumina process the cost of the chemicals would exceed £45,000 per annum in such a case as Leeds, and for the sulphate of alumina system would considerably exceed £20,000 per annum.

To return, however, to the question of calcination. It has been constantly objected, by persons unacquainted with the elements of chemistry, that cement derived from such a source must have some of the objectionable qualities of sewage, and must therefore be unsuited for plastering the walls of our houses; but people do not consider that to employ the material as manure for the vegetables they eat is, in itself, far more repugnant to our natural feelings. I am told that when some cement, prepared from sewage, was a few days since exhibited to a party of gentlemen, some of them could not be induced to touch it, though they were informed that the material had been subjected to calcination at a high temperature, and that every objectionable element which the sewage deposit may have once contained had been resolved into perfectly harmless inorganic compounds. I wonder if the same gentlemen had been informed that the vegetables before them at their dinner table were from Mr. Morgan's sewage farm at Barking, they would have turned out from them with equal disgust? And yet, if the fears of some writers on the subject are well grounded, disgust in the latter place would not be without some reason. Passing by the question whether water-cresses grown in sewage water produce diarrhœa, or feeding cows on sewage grass causes their milk to turn sour more quickly, or whether such feeding introduces parasitic disease into our beef and mutton, it must be admitted that organic life is materially modified by the food it lives upon, but no one, with the slightest pretension to scientific knowledge, would assert that a single particle of a deleterious nature can be left in sewage-made cement after calcination. On the other hand, many will be found who will contend that the practice of irrigation with sewage from which the fecal matters are not removed is liable to cause diseases of a serious nature, as well as a dreadful nuisance, and that the only certain way of preventing the propagation of the seeds of infection which may reside in the slush, is to destroy them by fire.

I think I may venture to assert, in short, that the strongest advocates of irrigation or of filtration are in favour of the removal of the slush as a preliminary measure; that most of the authorities prefer that this should be done by precipitation; that few of the chemists who have studied the question of manures will admit that sufficient fertilizing ingredients can be found in the slush to pay for the expense of collecting and drying the material; that the plan of burning the slush commends itself to most of the chemists and engineers who have considered the various modes of getting rid of its nuisances; and that the combination of the destruction of the slush by fire with the preparation of cement, for which the excellent precipitants and deodorizers, lime and clay, are precisely suited, offers the best prospect of turning an otherwise waste, useless, and noxious product into a marketable substance.

That I am not overstraining my case will be evident from the following testimony, not, be it remembered, solicited by me, but given in evidence before the parliamentary committee, which has just concluded its labours in the matter of the Birmingham Sewerage Bill.

Dr. William Odling, Professor of Chemistry at the Royal Institution, said: "I don't think there is any commercial value in the matter to be extracted at Dunton, except in its use as Portland cement." And Dr. Edward Frankland, F.R.S., one of the Commissioners of Inquiry into the Pollution of Rivers, said: "There are various modes of purifying the sewage, and I should prefer to deal with the sludge according to General Scott's system—namely, turning it into cement." "The process of treatment at Dunton, which I would recommend, is to mix lime and clay with the sewage shortly before it reaches the tanks. That would produce a complete deposit in the tanks, and would deodorize the sewage, which would flow on to the land without any smell arising from it; and the deposit also would be absolutely inodorous. That deposit would be dried and converted into Portland cement."

But, it may be objected, these are the theoretical ideas of men of science which practice would not justify. I therefore refer with satisfaction to the evidence to the same effect given by an eminent engineer. Mr. F. J. Bramwell, C.E., said General Scott's plan of "converting the sludge into cement is very satisfactory, and from what I have seen of the cement I have the highest opinion of it."

I have one more opinion to give you, and this, for obvious reasons, I have reserved for the last. It is given in the evidence of the distinguished engineer who occupies the chair this evening. If it is not what he really stated, he must blame the reporters, but the Birmingham papers give him credit for having asserted that "by adopting General Scott's process, it (the slush) could be converted into a very useful and valuable cement."

Let me say, in conclusion, that at the time when I requested Mr. Hawksley to take the chair this evening, I neither knew the opinion he had expressed nor the view he took of the matter. I believe, indeed, that his evidence must have been given and my note of invitation been written on the same day.

Mr. F. A. ABEL, F.R.S., said General Scott, in his paper, had so thoroughly and so fairly put forth the points of his case, and the merits of the process which he had brought forward, that he really found it difficult to add anything beyond the statement that, in the earliest experiments, having been consulted by General Scott as to his views relative to the probable success of what he then regarded from a somewhat theoretical point of view, he looked carefully into the various points of the process, and was particularly struck by the facility and the completeness with which it could be applied to the clarification and the precipitation of sewage. The process was at that time carried out certainly in no manner advantageous to its success, but the results which he (Mr. Abel) witnessed were conclusive in his mind, as far as the clarification and precipitation went. Further, he examined several of the products which were obtained by precipitating with a mixture, judiciously proportioned, of lime and clay. He examined them, not merely in regard to their power of being converted regularly into a species of cement, but also with regard to the quality of cement, and he found that it was equal to excellent Portland cement, or in another case to an excellent hydraulic cement of a different character, produced by another method. There was one point which the author of the paper had not touched upon—viz., that in removing the sulphur compounds from the sewage, which he did by this treatment, he added to the value of the product obtained by precipitation, inasmuch as the small amount of sulphate of lime which it thus ultimately disseminates through the sewage was undoubtedly a valuable cement ingredient, and he could, by modifications of lime and clay, form a quick-setting cement of peculiar properties, which was successfully produced in other ways. He (Mr. Abel) had endeavoured to satisfy himself thoroughly as to the utility of the process and the quality of the products, and he really believed that the plan was a successful and a profitable one.

Dr. Voelcker said that having had an opportunity of visiting the works at Ealing, he wished to bear testimony to the fact that the process of drying and manufacturing the dried material into cement could be carried on in the immediate neighbourhood of the town where the sewage was obtained without creating the slightest nuisance. The subject brought forward at this meeting in such an able manner by General Scott was one of very great importance, not only to town authorities but also to agriculturists; for he had come to the conclusion that agriculturists would never use sewage if they had to take it in the foul condition in which it had hitherto been delivered to them. But he was convinced that if sewage properly clarified were offered to the farmers, they would take it, and would find it a very useful liquid for irrigation purposes. General Scott had brought forward a matter which was intimately connected with the sewage nuisance. He (Dr. Voelcker) believed that the sewage difficulty would be at once solved if they had an effective and cheap process of getting rid of the slush. It struck him that this process presented some novelties which General Scott had not himself dwelt upon. Now in all the various clarifying processes either lime, or sulphate or phosphate of alumina, or some other chemical matter was used; but as far as he was aware, the combination of lime and clay simply had not been resorted to in any other process, and this certainly was a novelty. Then, again, another novelty was the comparatively large quantity of material which he employed. In all the clarification plans which had hitherto been put in practice, whether they were the lime, or the sulphate of alumina, or the phosphate sewage process, very little, comparatively speaking, of the precipitating agents had been used, for obvious reasons—reasons of economy. Now, in General Scott's plan, a very large proportion of earthy matter—clay and lime—was used, because the object was to bring out a useful product, and it was mainly due to this circumstance that the sewage slush did not enter into putrefaction. Now the lime process had been described as eminently successful. He wished he

could say the same thing. He thought it was successful so far in effecting a clarification of the sewage water, but, unfortunately, it created another nuisance, which was ten times worse than the unmitigated sewage slush. A little lime added to organic refuse matters hastened their decomposition, set up putrefaction, and created a very abominable nuisance. But in General Scott's plan a very large proportion was used, and with this was mixed a material which, like clay, possessed remarkable absorbing properties; generally speaking, for every particle of sewage slush, which contained, in a dry state, about 40 per cent. of combustible matters and 60 per cent. of mineral matters, three parts of additional earthy matter was added. The consequence was, that any products of decomposition, which no doubt would be formed, were absorbed and retained by the earthy matter. Be this as it may, it was certainly a fact that the material which was obtained by precipitation according to General Scott's plan, could be kept in a wet and pasty condition for two or three months. He had himself examined at Ealing some of the clay and lime sewage mud which had been kept for nearly three months, and he found it had no disagreeable smell. He did not think it was exactly like fresh bread, as some persons had said, but still the smell was not disagreeable in any way, and he was convinced that it might be kept any reasonable time without creating a nuisance. This led him to the third point, on which he would just offer a remark which perhaps might not have occurred to General Scott. It was this, that the material from which he made cement might be dried in the open air without creating a nuisance. Indeed, he believed it would be found in practice that air drying would be the most economical and probably the most efficacious plan of producing a material which could be burnt in a cement-kiln. There was a large quantity of earthy matter mixed up with the material which formed the sewage slush, and the consequence was that it got penetrated by air and dried itself; whereas one of the most difficult things in the world was to dry the deposit obtained by simple subsidence of the seawge slush obtained by the mixture of a small quantity of lime or sulphate of alumina. He knew of no substance which it was so difficult to dry, and, consequently, which it was so expensive to dry, as sewage slush; but by General Scott's plan, the deposit, being mixed with much earthy matter, was at once rendered porous, so that by exposure to air it dried itself, and this was a matter of very great importance, for, although no doubt sewage slush could be dried artificially and burnt, yet there was a great objection to this artificial drying in the expense which had to be incurred. The simple evaporation of the water was by no means a guide as to the expense. These were some of the points which had forcibly struck him as being in favour of General Scott's plan.

Mr. ANDREW MURRAY said it struck him as a very important point that General Scott was able to combine his method with the different schemes which had been adopted for the disposal of sewage. Dr. Voelcker had very well said that the farmer would not agree to accept the sewage in its fœtid and disagreeable state. He (Mr. Murray) would go farther, and say that the objection to sewage farms, on account of the strong nature of the sewage, was in itself a sufficient obstacle to irrigation being the general mode of disposing of sewage. He could speak as a witness on this point, because he recollected that, when a youth, he tried the milk which was supplied from a sewage-farm at Edinburgh. That milk was got from a company that was established for the purpose of feeding cows on sewage grass. The result was that the milk very soon became bad, and there was a very perceptibly disagreeable quality about it. Undoubtedly an unlimited supply of sewage would, more or less, affect every crop produced. He did not at all dispute that if only the right proportion of sewage were supplied to the ground a suitable crop would be produced, but if that restriction were made, the main object of applying sewage to ground would be lost—namely, the disposal of the sewage, for the sewage could not in that case be disposed of in sufficient quantities. General Scott's plan relieved the problem from that difficulty, for, by his process of clarifying, he removed the offensive or strong quality from the liquid, and enabled it to be applied to the ground in such quantity, and in such a form, as would produce crops not affected by the deleterious properties to which he had alluded.

Mr. VARLEY said that as the subject had a connexion with the purifying of rivers, he might state that he had observed that a margin of healthy vegetation along the banks of rivers and water-courses had a very beneficial effect in filtering in-flowing sewage, and preserving the water clear. It was, therefore, a mistake to attempt to entirely rid a stream of weeds, and the condition of the water was always deteriorated by the carrying out of such a measure.

Mr. WHITE said that he understood General Scott's paper to raise the question whether the sewage material was most utilizable for the purpose of fertilizing, or could be better employed for making cement. On the first question he knew nothing; but on the second point he wished to make an inquiry. He did not gather in the paper that the writer had given them any analysis of the sewage material, to enable them to judge how far that material itself, apart from any materials that might be added to it, was suitable for the purpose of producing cement. He took it for granted that it did not contain lime, and if a cement analagous to Portland cement was to be produced, 75 per cent., General Scott had stated, would have to be added to it. The question then came whether the sewage material itself contained the proper proportion of clay and aluminous matter which, when lime was added to it, and fuel was applied, would produce a cement of equal quality to Portland cement, or even hydraulic cement. It must be remembered that all sewage material would contain some considerable proportion of detritus in the shape of sand; and it was stated that it contained a large quantity of material that would burn, and, therefore, be available for purposes of combustion. But he understood General Scott that there was a deficiency of carbon in the combustible material. Therefore, he presumed that some such fuel as coke would have to be added, in order to bring about the perfect combustion of the cement. He also wished to ask whether clay was to be added. If it was necessary to add to the sewage material lime and clay and coke, which were the elements of Portland cement, then he wanted to know what was the material in the sewage which was available for the purpose of cement making.

Mr. ROBERT RAWLINSON, C.B., said General Scott, in the commencement of his paper, used the word "purification" when he thought he meant "clarification."

General SCOTT said he had misused the word. He meant "clarification." Another statement made below explained it.

Mr. RAWLINSON said that must be so, because the fluid portion of the sewage, when it had been treated by this process, remained in a better condition for irrigation, as he gathered from the paper, than it was in before taking the solid out of it. Therefore, if there was any chance of utilizing it for irrigation, it had not been robbed of any of the properties necessary for the production of vegetation. The mixture of lime and clay were put in such proportions as were requisite to produce the qualities of hydraulic cement. They were added to the sewage, and, as was stated, caused precipitation, and combined themselves with the material from the sewage—not that sewage had any ingredients to create Portland cement, but to create a fuel, as he understood, necessary for burning the lime and clay into cement equivalent to Portland cement. Well, if that could be successfully accomplished, he did not think it was a pounds, shillings, and pence question exactly. There was no process with which he was acquainted by which towns could treat their sewage so that it should be a profitable concern if they had to get rid of it without the means of putting it, by irrigation, to the land. The towns produced the sewage; it was a nuisance to the community, and it was necessary to the health of the community to dispose of it, and they must be contented to pay, by a rate in aid, for getting rid of that which was no benefit to them, and which, in its grosser form as discharged from towns, was an injury to the country. The sooner that was understood, and put on all fours, the better it would be for everybody. The doctrine had been preached that there was an enormous value in sewage. So there was as it was analyzed in the chemist's laboratory. The excreta of an adult, it was said, was worth so much (6s. 9d.); then a rule-of-three sum was made of it, and it appeared to come to so much per annum. That was not exactly the problem which we had to deal with. We had to deal with another set of facts. There was the sewage in a gross form, mixed with many ingredients that were not useful; and it was quite true that sewage in its grosser form carried down to the outlet a vast mass of detritus, which General Scott had not mentioned, and which it must be assumed he did not intend to take into his account, or deal with in the way in which he proposed to deal with the truly sedimentary particles, because a vast amount consisted of grit, so palpable when deposited in the tanks as to enable the persons at the outlets to cleanse the sludge or sediment from it, and take it out again; and they had, in some towns he was acquainted with, used that grit for paving and other purposes. That was not in General Scott's process. Then he would only suggest to the general, as his purpose was to make a material of commercial value of a certain kind, whether if by mixing in the proper proportions of dry powdered lime and dry powdered clay, making the bulk, no doubt, larger, this would not absorb the water and get the bulk in a condition sooner fitter for the kiln. Before he sat down, he would simply refer to one small allusion to the Chinese process, and, although it was a little wide of the present subject, he would like to say it. We were continually told that we must learn a lesson from China and Japan, but if people would only read the literature of those gentlemen who had had the good fortune or the misfortune to live in Japan or China, they would find that the Japanese and Chinese mode of dealing with the refuse of towns was of such an abominable character that the whole country was poisoned; and one writer went so far as to say that a ride or a walk in the vicinity of any town of China or Japan was utterly impossible if you wished to be free from the frightful stenches created along the sides of the road, and if you wanted to get a pure atmosphere you must go off so far as to traverse round the edges of their craters. He thought it was worth while to give that explanation, because the Chinese mode of dealing with the matter would not do to be introduced here. We must have our own mode, and that must be a mode by which we could avoid these great nuisances.

Mr. W. BOTLY said he should not have risen to make any observations if it had not been that he wished to express his dissent from the fifth proposition in the paper, which stated that, however valuable sewage might be to the farmer at such times as he wanted it, still, if he were obliged to take it at all seasons, he would prefer being without it. He had gone over sewage farms within the last few months—one at Aldershot and one at Beckenham—where the use of sewage was very great indeed. He had given a description in the *Farmer* of the farm at Aldershot, and, as he had stated in that paper, the land had been let at £25 an acre since the sewage irrigation; enormous crops were gained, and there was no nuisance at all. He would have given a statement of the various crops but for the length to which such a statement would have extended. The remarks of Dr. Voelcker on lime exactly coincided with what he said in that room a few weeks ago. He would repeat his entire dissent from the fifth proposition. At one farm the farmer assured him that, after straining the excreta and getting all the solid matter, the whole of it was, after fourteen days, brought into such a state that it was put over the farm in a very unobjectionable state, and that it only took fourteen days to decompose it suitably and fit for the operation.

Mr. W. HOPE, V.C., said he had listened with very great pleasure to the paper of General Scott, who had made a very original, and he hoped useful discovery. The sludge was always a great difficulty in dealing with sewage, no matter by what process or theory. But he thought the General had been a little hard on others who had been longer in the field than he had, in supposing that any of them would have devoted so many years as they had done to the utilization of sewage, if it were true that farmers would rather not have it on the condition of being obliged to take it all the year round. He (Mr. Hope) was one of those farmers who were very glad to take it and pay for it on the condition of taking it all the year round. There was no sort of difficulty in so taking it. The contrary idea was one of the most mischievous prejudices that had ever been set afloat on this sewage question, and he really did not know on what it rested, if on anything at all. He could not conceive of any possible mode of agriculture which could not devise means of utilising sewage on every day of the year. If a farmer, knowing that he must do so, did not reserve some piece of land on which to do it, that man must simply be a fool. Then he had listened with some regret to a passage in General Scott's paper, which was to the effect that he would pass by theories as to sewage irrigation promoting parasitical diseases, and so forth. It was a very great pity that he should have alluded to it if he intended to pass it by, because there, again, was a most mischievous prejudice, founded upon nothing but Dr. Cobbold's fears. No doubt those fears were perfectly justified in the abstract, but, as a matter of fact, there had been no single case traced, even by Dr. Cobbold himself, of parasitical disease in connexion with sewage irrigation. With regard to what fell from Mr. Murray about the cows fed in Edinburgh, he (Mr. Hope) thought that no sort of connexion had been established between the bad milk and the food on which the cows were fed. In nine cases out of ten the bad results were produced, not by the food, but by the water which the animals were supplied with. He really felt ashamed of telling the same story so often, but last year he had an ox killed on his farm, after having been shut up in the house and fed on sewage-grown grass for 22 months. That ox was dissected by Dr. Cobbold, assisted by Professor Marshall, of University College, and Professor Corfield, professor of hygiene; and although they examined the animal with the utmost attention, and even with the utmost jealousy on the part of Dr. Cobbold, there were entirely unable to find the smallest trace of any disease whatever. In addition to that, several veterinary surgeons and butchers said that they had never seen a more healthy animal. He attributed this result to the fact that the ox had had water from the house-well instead of from the horse-pond.

Mr. LLOYD said as the society had done the members of the Metropolitan Board the honour of inviting them to be present, perhaps they would excuse his making a few remarks both as a member of the society and as a member of the board. He was sure that those fellow-members of the board whom he saw around him must listen at all times with very great attention to anything that could at all elucidate the mystery which had to be solved in the utilisation of sewage. He gathered from the paper that the author proposed to utilize sewage by turning its result into cement. A very few days ago the members of the board went down to see the works of the A B C Company at their outlet. The proposition of that company was to utilize the product by turning it into manure. The Metropolitan Board were perfectly free and unfettered in any way with regard to the A B C system or any other system of sewage, and were prepared to treat with that which could be shown to be the best for the benefit of the metropolis. He hoped he should be excused for saying this, for he had found that an erroneous impression had gone forth that the board had something to do with the A B C Company further than allowing them to use their process on a portion of land belonging to the board. That was the only thing to which they were committed. He thought it necessary and fair to make that statement. It appeared to him that there were two great problems to be solved. The first was to clear sewage of its

impurities that they might be able to turn it into water-courses which carried off the effluent water. It must be so little deleterious that the water-courses would not be injured by it. And the next great problem was, whether the result or residue, if diverted from the water-courses, could be made a source of profit, so as to return something for the benefit of the ratepayers who had paid for carrying off the sewage. Those are the two great problems which ought to be set before scientific men; and when they had dealt with both in a satisfactory way, the Metropolitan Board and other nuisance authorities in the kingdom would only be too glad to step in and give aid. In the metropolis the sewage was already taken down to a point in the tidal river, where it produced no ill results, therefore the first problem did not so much concern London; but it was a matter of great urgency in many places, because there was no possibility of carrying the sewage into such a stream as the Thames. The question of turning the sewage to account was the great question yet to be solved. He threw out these propositions in the hope that some of the gentlemen who heard him and who were intent on the subject, might use all their energies in solving them. Whether sewage should be carried still farther from the metropolis and delivered on various farms, or be dealt with by the A B C or any other company, time would show.

Mr. F. J. BRAMWELL, C.E., said he did not know that he had much to add to what had been already said upon this subject, except to draw attention to something which General Scott appeared to have omitted from his paper, but which he had communicated to him (Mr. Bramwell) when he had the pleasure of seeing the process at Ealing. He would say a word first of all in reference to an observation of Mr. White, although perhaps it would be doing what Mr. White had asked General Scott to do—viz., to answer a question. Mr. White put it, "Does the water contain lime, and does the water contain clay? If it does not, then you are putting into it ingredients to make Portland cement. But why do that when you can make Portland cement without putting it into the sewer?" Now he supposed most sewage contained lime; but if it did not, it contained something which everybody was desirous of getting rid of, and that was the gluey, sticky, filthy sludge. That was a thing which everybody had decided ought to be got rid of before the water should go into any channel. That being so, supposing it contained no ingredient whatever to make Portland cement, but supposing that the materials to cause it to become inoffensive were such materials as made Portland cement, then you put those in, not because you wanted to make Portland cement, but because you wanted to make the sludge harmless and inoffensive; and if you could afterwards make Portland cement, why should not you do so? That he understood to be General Scott's proposition. As the object was simply to do that which he had stated, to get these matters deposited and the nuisance removed, there was a temptation, if they could not utilize the material resulting, to diminish the quantity put in, and thus the lime process, as Professor Voelcker said, had got into disrepute in a variety of places because it was endeavoured to be carried out at the least possible cost. But if they could, as General Scott had pointed out, get a saleable result, then the temptation diminished, and they got an entire deodorization. The question he wished to put to General Scott was this, which, no doubt, he would be good enough to answer. Supposing the sewage came in with different proportions of lime at different hours in the day, how did he deal with what he put into it so that the result of the compound should make a proper cement? He believed the sewage brought down lime, and supposing that varied in per centage on a dry day and a wet day, how did he regulate it so that it should always make, not Portland cement of necessity, but a good saleable hydraulic cement of some kind or other. Another thing he should like to ask was this. The sludge contained a considerable quantity of fuel, but he wished to know in practice how far that fuel was found sufficient for the purposes of drying and calcination, and how far it was to be aided by the use of coal and coke. With respect to the detritus, as Mr. Rawlinson had observed, that came down so rapidly when the settling tank was reached that it came out in the very first compartment, and therefore the fear in Mr. White's mind was that by no possibility could you get the ingredients you wanted, because the detritus mixed with them had no foundation, and we did, in truth, get the sludge unmixed.

Dr. STALLARD said he wished to utter his protest against any such proposition as that the Thames was not polluted by the present system of London drainage. He thought it would be wrong if no medical man got up to express an approval of the principles of General Scott's admirable paper. It seemed to be a suggestion which, if it could be carried out to an economical success, would be extremely valuable in every way. He thought that irrigationists would be quite as glad to accept it for application to the land as the ratepayers would be to adopt it to avoid a nuisance. At the same time, he would venture to throw out a hint that they must not expect too much even from this plan. It would differ very much as regarded the cost of carrying it out in different parts of the country, and there might be difficulties in that respect which might prevent it from being the universal remedy which at first sight it seemed to be. However, he thought it presented a most important improvement upon any suggestion which we had hitherto had in dealing with this matter. He thought the principle laid down by the gentleman who had just preceded him admirably expressed the real matter before the meeting, namely, that the line and clay were put in not merely for the purpose of making cement by a roundabout process, but because that roundabout process had the effect of doing away with what was at present an intolerable nuisance.

Mr. JONES said that as he was connected with Ealing, it might be a matter of some interest for him to make one or two remarks respecting the subject of the paper, though not necessarily to corroborate that which General Scott had stated in his paper. He (Mr. Jones) had been an unbeliever in a great many schemes which had been brought forward, and he looked upon them with that feeling which one was apt to gather from many years experience. He had watched General Scott's process for six months, and, in respect to many of the points of which he had considerable doubt when it was first introduced, he believed that General Scott had succeeded very well. The material could be dealt with after three months had passed away, as General Scott had stated. He believed that it might be retained without the slightest inconvenience for any length of time—even fifty years. At the works at which he (Mr. Jones) had made observations, there was not the slightest inconvenience felt in any way from the presence of the material. He had seen material turned out by the process which he should certainly pass as cement without the slightest hesitation. With respect to the question that had just been raised as to the use of materials, he took it that we had a nuisance to get rid of, and it certainly mattered not whether the sewage was used for growing cabbages or making cement, so long as it was disposed of so as to avoid an intolerable nuisance. The question of cleaning the sewers was a most important one, and the process certainly had a very salutary effect in getting rid of the sewer gases. He could walk through his main sewer without the slightest inconvenience from them. With respect to the expense, General Scott had not stated as much as might have been stated on that subject. Ealing was a most difficult place at which to carry on the process, because the cost of lime and coal was larger there than in many other places where the process might be introduced. He (Mr. Jones) believed that in a place with a population of 20,000 persons, double that of Ealing, the scheme would absolutely pay, and that was an important feature in connexion with the subject. He had tried nearly every system at the Ealing works during the last eight or nine years, and he had seen none which had succeeded so well as that which General Scott had introduced. He believed that in towns where the separate system of sewage was carried out, there would be no difficulty whatever in the process. At Ealing there was a difficulty, because they took a large amount of surface water into the sewers. He had felt it just to make these remarks as to General Scott's proposition, and he made them as one who had watched the process, he might say, night and day for six months.

Dr. ODLING, F.R.S., said that he had seen General Scott's process carried out at Ealing, and he must say that he was very much impressed with it. It appeared to him that whatever might be the ultimate disposal of sewage, there must be a large number of cases in which it would be desirable to separate the sludge from the liquid matter, and the manner of separating the sludge adopted by General Scott was certainly most complete. Then remained the question, in what manner or for what purpose this sludge should be disposed of; and in dealing with that question General Scott had struck out a new line of work. He had availed himself of what Mr. Bramwell had called the "fuel" in the material, and he had availed himself of its other most valuable constituents, and he had recovered the material with which he effected the process in a form more valuable than it was before it was used. Economically, the scheme seemed to him the most promising of all which had been introduced for the purpose of dealing with sewage, and throwing down the sludge from it, and then dealing with the solid portion, so as to convert it into a useful marketable article.

Mr. GRANT said that anything coming from General Scott, with respect either to the manufacture of cement or to the utilization of sewage, must be received with very great respect. At the same time, the subject presented itself to him (Mr. Grant) most forcibly as one at which they must look from an economical point of view. He hardly knew whether the general proposed this scheme as an economical way of making cement, or an economical way of dealing with sewage by making from it a valuable and saleable thing—namely, cement; and that although the cement by itself may not be made cheaper out of the sewage material than it would be out of the materials of which it is at present made, yet that it would be so far an economy inasmuch as it would be something left to pay for the process of dealing with the sewage. Cement was made of lime and clay in the proportion of two parts of the one to one of the other. The cost of the materials for making a ton of cement might be taken roughly as 7s. 6d. He should like to ask General Scott whether the materials he expected to get from sewage would reduce that cost. Could he make a ton of cement by his process at a cheaper rate than it could at present be made out of chalk and clay, which the cement manufacturers used? If not, how much must be put down against the process of dealing with the sewage, or how much was to be paid out of the second part of it. He had very great doubts of General Scott so treating the sewage of London as to make cement more cheaply than it was at present made by the cement manufacturers. If he had not had so much to do with the London sewage as he had, he might not have felt any doubt on the point; but all who had to deal with sewage on a large scale knew that the enormous quantities of matter to be dealt with was the great source of expense. Such a bulky thing as sewage, whether the solid or liquid part, could be moved only at a large cost. If they added to the solid part of it by putting lime and clay into it, they would add to it in the most expensive manner those materials which could be used for the purpose of making cement. He did not believe that 7s. 6d. would go far in mixing clay and chalk with the sewage of London, although by the usual process of cement making, a ton of cement could be produced from materials costing that sum. For that reason he doubted the economy of the new process. He did not doubt the possibility of making cement out of the sewage. He had that evening seen specimens of cement which, as it had been stated, had been produced out of sewage; but there was no means of telling how much of that cement came from the sewage proper, and how much came from the chalk and clay which were added to the sewage. Unless they knew that, and knew it, not simply as an experimental thing ascertained in the laboratory, but from working on a large scale and in actual practice, they were not, he thought, in a position to judge whether or not the system would pay. In what he had said, he did not wish for a moment to retard General Scott or any one else in dealing with the sewage in this way or in any other way. He had observed what had been said by one of the members of the Metropolitan Board, which was, that those who were interested in the drainage of towns would be glad to find any feasible mode of dealing with the sewage question, because even if it did not pay commercially, but paid approximately, it would be a god-send to them. He endeavoured to keep his mind perfectly clear in looking at any mode of dealing with sewage, whether in a liquid or in a solid form, or for farming or making cement.

Mr. MARSHALL said the remarks which Mr. Grant had made appeared to go to the root of the subject, and they were such as would obviously occur to any one who had anything to do with dealing with sewage. The first point was whether they could make cement out of sewage cheaper than they could make it in the ordinary way; and the next point was the effluent water. He feared that the process still left that question in the condition it was in before. They could clarify the sewage in the process of making the cement, which was really the lime process, but the effluent water would be as difficult to deal with as before. The great difficulty to be dealt with in this country was, that they could not discharge the sewage into brooks and streams throughout the country. It was stated that the lime process failed at Tottenham because there was not sufficient lime used. That was a total mistake. If too much lime was put in, it produced a lime water which was not fit to go into any stream whatever, and sewage containing it, if it went into a ditch, would become very shortly as bad as if it had never been treated with lime at all. If by the proposed process they could produce cement cheaper than by the use of ordinary water, then they had got something to which they might look for a profit; or if for the same cost they could produce a better cement than by the ordinary method, that also would be an advantage. These were things open to the chemist to settle; but if the sewage was clarified by lime and alumina throughout the country, it must still be passed over land in some shape. He quite agreed with the remarks made with regard to passing the water over land. Irrigation was no doubt one of the best modes of dealing with sewage, but the plants ought not to be forced with it. An excess of it produced a black mark on the stalk of the plant, which took three weeks to clear away. He thought that a combination of General Scott's process with irrigation might be a solution of the difficulty. The point, however, still remained, whether the sewage would produce cement at a cheaper rate than it was made at present. Possibly it might be found that cement could be made from sewage without the addition of lime at all, and we might find that we could afford to plaster our houses inside and out with cement through the product obtained becoming a drug in the market. He believed that in dealing with the sewage of London enough cement would be produced to build the whole of London over again.

Mr. J. GRANTHAM said he had had the means of watching General Scott's process a little. He had sent an inspector from the committee of the British Association, and they had a favourable account and report of it. At present there was not a good opportunity for making experiments, and he proposed that a further investigation should be gone into. General Scott had given every facility for making experiments. He looked upon it as a very great improvement and advantage if they could get rid of the sludge in some way or other, by drying processes, or by any other means which could be devised. General Scott's plan, as far as he was aware, was certainly the best, and he really hoped that it would prove successful, and be adopted in many parts of the country.

Dr. LETHEBY said that, in common with all who took any interest what-

over in this question, he had had a good deal of satisfaction in listening to the paper read by General Scott, not merely because it seemed to offer a practical means of solving a great difficulty, but chiefly because it seemed to him to be the means whereby people of the most opposite inventions, and theories, and practices, might be brought somewhat into harmony. On the one hand, those who were advocates of the precipitating process would find in it the means of carrying out all they wished; and, on the other hand, those who were particularly anxious for the use of the sewage water or effluent water upon the land, would find an opportunity of using it advantageously. For thirty years men had been fighting, so to speak, over this great question, and had held those two opposite opinions in respect of it. It so happened that in 1842 the lime process was first patented by Mr. Higgs, and from that time to the present we had had a succession of precipitating processes, and some of the wildest and most enthusiastic theories, and hopes and expectations with regard to the results of those processes. On the other hand, it was exactly thirty years ago that Mr. Smith came to London to the old Board of Health, infatuated with what he had seen at Edinburgh, and through his friend Mr. Chadwick started this theory of universal irrigation. From that time we had had those two diverse lines of pursuit—one class of people arguing that nothing but irrigation—nothing but the use of sewage upon the land—was proper, and others that nothing but precipitation was proper. Now, as far as he (Dr. Letheby) could gather from the account of the process which had been given by General Scott, in the first place, and from what he had seen of the process himself, in the next place, at Ealing, it seemed that it offered a means of harmonizing those who had held the most opposite opinions on the subject. There were two or three points to which he thought it essentially necessary that General Scott should direct his attention. In the first place, it was necessary that the treatment of the sewage should be by an intermittent process, and not by a continuous process. He did not mean to say that the matters to be used for precipitation should not be introduced into the sewer at a considerable distance from the precipitating tanks, but he did say that there should be tanks of such a size that you might, at a given period of the day, have something like an average quantity of sewage, and have an average product, and next that you should give an opportunity to the precipitating matters quietly to subside before the supernatant liquor was discharged. If that were not done we should be sure to have an accumulation of the sludge in the bottom of the tanks setting up secondary fermentation. It seemed to him to be essential to the success of the process, that it should be an intermittent and not a continuous operation. In the next place it was advisable that there should not be too much lime used in the precipitation. At the time of his visit there was no doubt a very great precipitation of lime; in fact it was a saturated solution of lime that was passing away into the water. If that fell into any stream it would do much mischief. The stream would become turbid and disagreeable in appearance, and certainly where there were fish it would be deadly to them. Thirdly, there should be a careful attention to the quick removal of the sludge from the bottom of the precipitating tank. Wherever it remained more than two or three days it started decomposition of the supernatent liquor, and that decomposition was of a most disagreeable character. Fourthly, there should be a very quick drying of this sludge, for although it appeared, from the experiments which had been made up to this time, that sludge did not undergo offensive decomposition, nevertheless, from his experience of the lime process, and, indeed, of almost every precipitating process, the sludge would not bear to remain in the liquid state for many days. In the case of lime the material was most offensive. Lastly, there was a difficulty which might arise in the course of these operations, and that was that, though upon a small scale, it did not appear that the burning of this material was attended with any very offensive emanation, yet he had had to do with nuisances through the manufacture of Portland cement where sewage mud had been used in the process of manufacture, and it had led to such an offence to the neighbourhood that injunctions in Chancery were granted to abate the nuisance. It was, therefore, a matter for future consideration how far the process could be carried on in the neighbourhood of towns without being offensive. He would grant that the sludge obtained from the precipitation of sewage was very different from mud that was dredged from the rivers, and particularly tidal rivers, inasmuch as the common salt present in the mud invariably produced a large quantity of muriatic acid through the burning of the cement, which was one of the main causes of offence; but in one of the cases which he had alluded to the action lay on account of the use of sewage mud. One other point had struck him during the reading of the paper and the discussion which had arisen out of it, and that was as to the quantity of cement that would possibly be produced from a given quantity of sewage. Now, looking at the experience which we had during the days of the old Tottenham works and of the works also at Leicester, it was found in practice that the proportion of solid matter that was obtained was invariably between four and five times that of the lime used. He calculated, therefore, that two tons and a half of this cement would be obtained from a million gallons of sewage. That would be about a ton for every 10,000 people per day. Well, he did not know what might be the demand for cement, but it not strike him at first sight as being a very large quantity. Such a quantity might very well be used in building operations.

Mr. W. SMART considered that the Society of Arts would do good service to the community if they took this important question up.

Major-General SCOTT said, in reply, that the greater portion of his task had been already performed, for some of the speakers had replied to questions raised in the course of the discussion. Mr. White seemed to think there was some difficulty in apportioning the ingredients, in order to make Portland and other cements, if they were to be made through the intervention of a sewer. Now, he could not see any more difficulty in carrying out the process by throwing lime and clay into a sewer than there would be in throwing in chalk or clay in a wash mill in a manufactory. Mr. White might use white chalk in his manufactory, as he (General Scott) believed he did; but on the Medway the manufacturers used chalk containing various proportions of clay, in some cases 10 per cent., and in others nearly 20 per cent., and still managed to keep themselves pretty correct in their quantities. In the case of sewage, you have a somewhat varying amount of clay and lime present, but still they were as constant as in grey chalk, or, at all events, so constant, that if he could not in all cases succeed in making Portland cement, he could succeed in making a cement of a very good quality, or, at least, hydraulic lime. In the case of Ealing, the two ingredients ran quite as closely together, if not more closely, than in the ordinary manufacture of Portland cement. In fact, he had mentioned in his paper a point which occasioned difficulty in apportioning the ingredients in making Portland cement which did not occur in sewer-made cement. The chalk and clay in the ordinary manufacture were ground to different degrees of fineness, and there was always a tendency in chalk to precipitate first, and it was customary to intercept the coarser particles, to prevent their going into the tanks. Now, that was not the case in the precipitation from sewage. Both the lime and clay settled down in so finely-divided a state that you could form a much more homogeneous mixture than you get in the deposition of chalk and clay. He never had the pleasure of visiting Mr. White's works, though he hoped Mr. White would give him an opportunity of doing so, but he believed Mr. White endeavoured to obviate this evil by means of a stirring apparatus in the settling-tank itself—the large tank in fact in which the clay and chalk were collected. Now if that was the case, it showed that there was a difficulty in Mr. White's factory in getting a complete mixture. Of course it was very difficult in a paper of this sort to follow all that was read, and he was not surprised that Mr. White had questioned him on a point which he had hoped he had explained. He had stated that sewage water contained a large quantity of carbonate of lime, held in solution by carbonic acid gas, and that if you added some lime to such water you got a precipitate out of it, because the lime which you added combined with the carbonic acid which was holding the carbonate of of lime in solution, and by properly apportioning the line added, you obtained a considerable amount of ingredients in that way beyond the precipitants introduced. He had been rather struck with the different points of view from which gentlemen who, in some way or other, were interested in cement, or who were interested in sewage, viewed this question. Mr. Grant and Mr. White, of course, looked at it from a cement point of view, and asked whether cement so made would be commercially profitable. Another gentlemen who had spoken looked at the question entirely from a sewage irrigation point of view. Mr. Hope had taxed him with having "passed by" a very important question—viz., the possible injury that might arise to animals on sewage farms. Now, he could not see why it should be supposed that he had such an intimate acquaintance with the effect of sewage-grown grass as to be able to express an opinion on this disputed point. It was not his business to enter into such a question, and he passed it by simply because he could offer no opinion upon it, and, for the objects of his paper, it was unnecessary to express one. But he thought that if his paper had been more carefully listened to upon that point, Mr. Hope would have seen that really it stated that irrigation or filtration was the only complete way of completely getting rid of the contaminations of the sewage-water. He had said this:—"My scheme makes no claim to the complete purification of sewage-water, or to supersede the irrigation or filtration." Surely, if that meant anything it meant that he was rather an advocate for irrigation and filtration than the contrary. His real view was, that if farmers made use of sewage in proper amount, they would really get very excellent results out of it; but if the sewage was thrown on the land at all seasons, he was not so certain about it. He was, however, quite sure of this—that, notwithstanding what Mr. Hope had said there were farmers who were using sewage, and who would not take it at all times. It was only the other day that he lost his way and got down to the Barking Road Farm, and had the pleasure of a conversation with the gentleman who managed it. He (General Scott) said to him, "What do you do in very wet weather?" "I don't take the sewage," was the reply. "They tell me I must take it, and I say I won't." Mr. Bramwell had asked what would be done if the quantity of clay in the sewage varied. He had already replied, by saying that he should make hydraulic lime, or some other description of cement than Portland—not requiring the same accuracy in apportioning the ingredients. And that was really the reply to another remark which had been made during the evening—namely, that the amount of cement which he would make would be more than the country could use. The gentleman who made that remark must remember that he had shown that he could produce either Portland cement or hydraulic lime, and avoid throwing more cement material into the market than was required; he merely, in fact, passed the lime through the sewage, and brought it out in an improved form. Several questions had been asked with reference to the cost of the process. He thought that the gentlemen who asked those questions must admit that they were asking him, considering the varying conditions of the problem in each locality, a very difficult question indeed, but he could venture to say that in a place of five-and-twenty or thirty thousand inhabitants, with sewage works already in existence, and having lime and clay at the ordinary cost, there might be a profit of 20 per cent.; such profit must manifestly vary with the number of the people in the place, the price of lime, the price of clay, and the condition of the sewage itself. It should, however, be borne in mind, as some of the speakers had brought out very strongly, though others appeared to forget it, that the first object was that the sewage should be purified; and the question was whether he was proposing to them a better plan than had hitherto been proposed for effecting that object. There were other theories and schemes, and he might have shown how good his position was by comparing his process with other schemes, but he had abstained, for obvious reasons, from making comparisons with plans which had been introduced by other people. He might say *generally*, with some confidence, that where a town was large, and where lime and clay were cheap, cement might be made with a considerable profit. On the other hand, in a small place like Ealing, he did not suppose for a moment that the process would entirely relieve the inhabitants from taxation for the disposal of their sewage. Since he had read his paper, a gentleman had asked him whether his scheme was applicable to a large isolated establishment in the country." He had replied to him, "My dear sir, you had better get earth closets. Manifestly, his scheme was not applicable to such a case as that. He believed that he had now replied to most of the questions, but in a little pamphlet which he had printed, but not yet published, he had gone into the figures as to the materials used in making the cement, and he found, as Dr. Letheby had stated, that from a million of gallons of ordinary sewage water, about two tons of cement or rather more would be produced in a day. He believed the cost of producing that quantity, for materials and labour, would be something like £2 at ordinary prices, leaving £1 for wear and tear, the first outlay, &c.

The CHAIRMAN said there was one point to which General Scott had not alluded. It was the question of Mr. White as to the quantity of additional fuel it was found necessary to burn the cement.

General SCOTT said that Mr. White would understand as well as anybody when he explained to him that his kiln was only about 4 ft. 6 in. in diameter, and 12 ft. high, that he could not make any exact statement on that point. But he certainly got a most intense heat by means of the fuel which was in the sludge. As to the small heating power of the gas of sludge, to which Mr. White had referred, it was well known that the conditions in which hydrogen and carbon existed in fuels varied very much indeed. A body might be very rich in carbon, and yet give a very poor illuminating gas. The illuminating power of the gas, in fact, did not bear very much on the question of heating power, for though there might not be much carbon present in sewage gas, there was a good deal of hydrogen, which gave a more intense heat. In his small kiln, in which he put a ton of material, and from three to five bushels of coal, he had a flue carried under the drying-floor, and he was able to keep that drying-floor red-hot by this means, as well as burn the mixture to Portland cement. He believed that when he had got to the point of working a large kiln, his difficulty would not be a want of sufficient heat, but that he should have some difficulty in controlling it.

A vote of thanks to the author of the paper was unanimously accorded by the meeting.

THE WEATHER-WASTE OF COAL.

[From the *Journal of the Franklin Institute*, No. 553.]

Dr. Varrentrapp has made this the subject of an investigation, and as a result states that the amount of loss suffered by coal from exposure to weather is considerable, far greater, indeed, than is generally known.

The results of his analyses show in some cases a total loss in weight of a specimen, from this cause, amounting to 33·08 per cent., while its deterioration in quality for purposes of fuel or gas-making reached a still higher figure.

This change consists in a slow combustion, in which the volatile constituents

—which are most valuable combustible elements—are gradually eliminated, while the relative proportions of carbon, ash, and sulphur are comparatively augmented.

It might be expected, now that the nature of this change is indicated, that anthracite (which has already gone through a very similar process in becoming what it is, by the loss of its bituminous matter) should suffer least of all coals from this action, and the result of analysis shows this to be the case. The density and compactness of this variety, aside from its chemical character, protect it in no inconsiderable degree.

The cannel coals rank next in their power to resist deterioration from this source; while the bituminous varieties are the most susceptible.

The experiments of Dr. Varrentrapp are of such direct and practical importance that all who are engaged in the mining, transportation, storeage or consumption of coal can study them with profit.

It appears, from accurate tests of a number of samples before and after exposure, that all the valuable properties of the coal had deteriorated.

The coking quality of the weathered coal diminishes with its gas-yielding quality, the author informing us that a sample of coal yielding, when freshly mined, a firm coherent coke, after eleven days' exposure, yielded a coke of no coherence, and in all the samples tested the rule was absolute that the longer the coal had been exposed the greater was the inferiority in the quality of the coke it produced.

The gas-yielding quality decreased in one instance 45 per cent., and the heating power 47 per cent.; while the same sample under cover lost in the same time but 24 per cent. for gas purposes, and 12 per cent. for fuel.

These experiments go far to explain the almost universal inferiority of the slack or waste coals in heating power when prepared for burning, even though some combustible material like pitch or tar is used in their cementation. It indicates, too, the imperative necessity of keeping coals amply protected from the deteriorating action of the air and moisture by keeping them constantly dry and under cover.

HONG KONG AND CHINA GAS COMPANY, LIMITED.—A dividend of 10 per cent. per annum free, of income-tax, for the year ending December 31, 1871, was declared at the annual general meeting of shareholders held on the 24th ult.

SALE OF THE SITE OF DISUSED GAS-WORKS IN THE METROPOLIS.—The ground lately occupied by the works and offices of The Gaslight and Coke Company, Curtain Road, has been sold in its entirety, by Messrs. Norton, Trist, Watney, and Co., for £20,000.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.—This company has given notice to its consumers to reduce the price of gas from 4s. 6d. to 4s. 4d. per 1000 cubic feet, after Midsummer day next. Eighty-eight of this company's shares were sold by public auction on the 8th of May by Mr. Alfred Richards, at the Lecture Hall, Tottenham. Fifty-five shares, fully paid-up, £5 each, averaged £9 15s. 10d. each; and 33, £5, £3 10s. called up and paid on each, averaged £8 6s. 8d. each.

TESTIMONIAL TO MR. JAMES YOUNG, OF STOKE.—On the 14th ult., the *employés* of the Stoke, Fenton, and Longton Gas Company assembled at the Works, Wharf Street, on the occasion of a farewell party, and for the purpose of presenting to Mr. Young a testimonial, upon his resigning the office of engineer and manager, to fulfil a similar appointment under the British Gaslight Company at Hull. The testimonial consisted of an address printed in gold, together with a handsome French gilt timepiece, bearing the following inscription:—"Presented to John Young, Esq., by the *employés* of the Stoke, Fenton, and Longton Gas Company, as a mark of respect and esteem on his resigning the office of engineer and manager, April 30th, 1872."

THE PURCHASE OF THE RYDE GAS-WORKS.—A most unfortunate state of things exists at the present moment in the borough of Ryde. The council pressed the purchase of the gas-works without adopting the custom in other boroughs—viz., calling a meeting of the ratepayers when a scheme of such magnitude is in contemplation. Our local legislators negotiated for a loan of £60,000 with the Norwich Union Insurance Office at 4½ per cent., and up to this time the local government board, although two inquiries have been held by Mr. Morgan, will not consent to the extension of borrowing powers. In the meantime the Norwich Union have invested this large amount in Three per Cent. Consols., and the town has to pay from November last the difference in the interest, amounting to about £900 per annum, being about as much as the whole of the public lights cost. Under these circumstances the Ratepayers Association, headed by the leading gentry, and certainly a very large majority of the burgesses, have had a meeting, and guaranteed nearly £1000 to contest the point with the council. A pleasant prospect truly, considering that the ratepayers would in the end have to pay the piper. The ratepayers at the meeting alluded to elected six of their number to meet six members of the corporation for a conference, which, it is hoped, will lead to good results, but in any case the town must inevitably be saddled with heavy costs.—*Hampshire Advertiser.*

BURSLEM AND TUNSTALL GAS COMPANY.—The annual meeting of the shareholders of this company was held on the 31st ult., at the offices, Longport—Mr. A. Shaw in the chair. The following report was presented:—

The directors have much pleasure in presenting the following statement of accounts, which give evidence of the continued prosperity of the company. It must be confessed, however, that to a favourable coal contract is to be attributed much of the success which has been attained during the year, and that many circumstances—such as increased cost of coal and all materials, reduced hours of labour at manufactories, and the early closing movement among shopkeepers—combine to render the future success of the undertaking somewhat uncertain. The present contract for coals expires early in September, and as the directors will have to pay a large advance for future supplies—probably amounting to 40 per cent.—it becomes imperative upon the company to increase the price of gas to a charge of 3s. 6d. per 1000 feet from the 30th of September next. This increase will realize about £800 per annum, against an increase on the coal account of £1100. The directors have much pleasure in reporting the efficient condition of the plant throughout, and they have reason to believe that in the future the company's gas will attain a much higher standard of purity. The balance of profit amounts to £2936 16s. 1d., out of which sum your directors recommend payment of the usual dividends. The directors have to regret the decease during the past year of their esteemed chairman, the late George Baker, Esq., so long and honourably associated with this company, and also of Mr. J. Lowndes, their newly-appointed auditor. In the room of the former, your directors have with much satisfaction secured the services of Anthony Shaw, Esq., and of Mr. Thomas Hulme as auditor. Three directors—A. Shaw, Esq., J. Shirley, Esq., and Joseph Alcock, Esq., and one auditor, Thomas Hulme, Esq., retire by rotation, and offer themselves for re-election.

The increase of 4d. per 1000 feet in the price of gas was freely discussed, but all present were convinced that the advance was reasonable and necessary. The report was afterwards adopted, the retiring directors and auditor were re-elected, votes of thanks were accorded to the chairman and directors for their efficient conduct of the company's business, and the meeting terminated with an expression of admiration for the services rendered by the late chairman of the company, Mr. G. Baker.

SERIOUS ACCIDENT AT SALFORD.—On the 17th ult., a labourer named Joseph Orford, very nearly lost his life at the Salford Gas-Works, Lamb Lane, under the following circumstances:—He was engaged working at a wall of cannel coal, when the whole wall fell, burying him to a depth of four feet. His fellow-labourers immediately set to work to extricate him, and after working a short time were able to clear his face and the upper portion of his body. The quantity of coal which fell was between 30 and 40 tons, and it was not till the men had worked three hours that they were able to extricate the sufferer. In spite of the immense weight under which he had lain so long, the man did not, when rescued, appear much the worse for the accident. No limbs were broken, but he was very much bruised and cut about the head and arms. He had been struck by the spades of some of the men who were engaged in liberating him.

DUNDEE.—A FAMILY NEARLY SUFFOCATED BY GAS.—A family of four persons, residing in Dudhope Crescent, Dundee, were nearly suffocated by gas on Saturday, May 18. They went to bed on Friday night at ten o'clock, and next morning all were ill, though none could explain the cause. At two p.m. they were found lying insensible in bed by some of the neighbours, who successfully applied restoratives. The gas had accumulated in the house during the night. The leakage could not be found, and the gas was therefore turned off in the street. Immediately on the case being reported to the Gas Commissioners, one of their officials was despatched to the abode of the sufferers to cut the pipe which supplied gas to the land in which the room was. On the following day, on examination, it was discovered that the leakage had been caused by nails having been driven through a gas-pipe which passes along the wall of the house in which the accident occurred, beneath the plaster, to another dwelling. This narrow escape from death should serve as a warning to others to be very careful as to where they drive nails in the walls of their rooms, and how they handle gas-pipes.

ACTION FOR DAMAGES CAUSED BY A GAS EXPLOSION AT HOLLOWAY.—On the 22nd ult., at the Sheriff's Court, Red Lion Square, before Mr. Under-Sheriff Burchell, the case of *Hinge v. Wildee* came on for decision. It was an inquiry, before the Under-Sheriff, to ascertain the amount of damage sustained by the plaintiff, resulting from injuries caused by an explosion of gas in the defendant's house, the Franchise Tavern, Franchise Street, Holloway. Mr. Willoughby, instructed by Mr. Ricketts, solicitor, of Frederick Street, King's Cross Road, appeared for the plaintiff; Mr. Wildee defended in person. The plaintiff is a veterinary surgeon, and in the month of October last, he was in the defendant's bar having refreshment with some friends, when he detected a strong smell of gas, which fact he mentioned to the defendant, who told him to mind his own business and not to interfere with his. After that, the defendant got a ladder and went into the counting-house to a gas branch there, and commenced rubbing into the stem of the burner some grease from a candle, which he had in his hand; he then called for a "swab," or counter cloth, and upon it being handed to him, he tied it with some string round the pipe of the burner. He then applied a lighted candle to the burner, for the purpose of testing it, when an explosion ensued. The plaintiff was thrown down, his head was severely cut, and he was rendered senseless. Upon regaining his senses he found the place in darkness above, but one of the burners below had burst from the force of the explosion, and the gas was issuing in a large flame from it, and was "licking" its way unto the ceiling. The plaintiff got up, turned off the gas, lighted a candle, and looking over the place found the defendant lying senseless near the counting-house, and his manageress, Mrs. Warren, also in a state of insensibility. The plaintiff took defendant to his room, where he was confined for some months. The plaintiff was blind for several days, and at the expiration of a week he was requested by the defendant to take charge of the business, which he did from that time until December, when he left to attend to his own practice, which was, it was stated, a most lucrative one. The plaintiff swore that, up to the present time he had an occasional dizziness to which, previous to the accident, he was never subject. The action was commenced in January, and the defendant allowed judgment to be signed in default of plea. The jury assessed the damages at £55. A short time since an action was brought by Mr. Ricketts on behalf of the manageress in the same tavern in the Court of the Exchequer against Mr. Philip Wildee on account of the same explosion, and the verdict was for the plaintiff with costs.

GAS LIGHTING IN BUENOS AYRES.—On Saturday, April 6, the first general meeting of the Mutual Gas Company took place in the large hall over the Alegria Theatre. The object of the meeting was to revise the statutes and appoint directors to supersede the provisional ones, and generally to explain to the shareholders the plans, &c., and the proposed mode of carrying out the works. In the unavoidable absence, through illness, of Dr. Beccar, the chair was taken by Sr. Bustamante, who opened the business by a plain and most businesslike speech. He touched on the extravagant price of 140 m/c dols. per 1000 cubic feet charged by the old company, and generally explained the prospectus of the new company to the meeting. Nearly £90,000 had been already subscribed, and further applications were being received daily. On the conclusion of the chairman's speech, it was proposed that the provisional directors be continued, to which the shareholders affirmed unanimously. Several shareholders addressed the meeting, and one of them referred to the large number of shareholders present, as showing the great interest the gas-consuming public took in the company; and of its success there could be no doubt. Buenos Ayres was scarcely lighted with gas lamps in one-third part of the city, and that about 2600 oil lamps, with their feeble glimmer, were still to be seen in our Modern Athens; and taking into consideration that nearly 2000 more lamps could be further erected in districts not lighted either with gas or kerosene, the prospects of the company could not be over-estimated. It is a notable fact that the leading street of this city is not lighted with gas even half way down its whole length, and that past the Once de Setiembre it is really dangerous to walk after dark. Plans showing the proposed site of the works, the districts first to be lighted, the sizes of the mains, &c., were submitted to the meeting, and approved of. It is the intention of the engineer to have the leading main pipe larger even than the old company's, and generally to lay out the works for the greatest extension at the slightest possible cost. The secretary of the company then drew up a memorial to the municipality asking permission to open up the streets, to which every one present gave his signature. Our representative was present, and speaks of the meeting as being one of the best and most successful that has ever taken place in this city.—*Buenos Ayres Standard.*

WEST LANCASHIRE COAL TRADE.—A meeting of the coal proprietors of the Wigan and West Lancashire districts was held on the 29th ult., at the North-Western Hotel, Liverpool, when it was resolved that the wages of the colliers in the districts should be advanced 10 per cent., and the price of coal correspondingly advanced from the 1st of June.

PURIFICATION OF THE RIVER DON.—The Corporations of Sheffield, Doncaster, Barnsley, and Rotherham intend holding a conference as to the disposal of the sewage now flowing into the River Don.—*Leeds Mercury.*

BATH WATER SUPPLY.—The Lords of the Treasury have refused the petition of the Bath Town Council to borrow £14,000 for the completion of the water-works of that city.

BRADFORD WATER SUPPLY.—The new Brayshaw reservoir, at Horton Bank Top, constructed by Messrs. Fogg for the Bradford Corporation, is the first reservoir made by contract for the corporation that has held water. This reservoir is situate about 900 feet above the sea level. It is supplied by water from Thornton Moor, has been full several weeks, and is perfectly sound and tight. It has cost £22,237 3s. 6d., and will furnish a supply of water to the high level districts around Bradford. The Water-Works Committee recommend the corporation to accept the tender of Messrs. Crabtree and Sugden, of Keighley, for the formation of two compensation reservoirs at Leeming and Leeshaw, Oxenhope, for the sum of £59,000.

ST. HELEN'S WATER SUPPLY.—The well sunk by the St. Helen's Corporation at Whiston, which for a long time was looked upon by a section of the council as a failure, is now yielding a very considerable supply. It may be remembered that the fault was discovered in the boring at an angle, for which only one other parallel is known in England, and the supply then given was little over 300,000 gallons a day. The special Water Committee a few months

ago decided upon tunnelling in the direction of the pebble-beds, and the work has gone on since that time. A fortnight ago the Water Committee ordered the tunnelling to cease for four months, and the water to be sent to the town, to relieve the scarcity, but the resolution had to await the ratification of the council, and in the interim the work has been pushed forward. It is supposed the pebble-beds have been reached, as there is a tremendous rush of water into the well, which the power of two engines is insufficient to drain out. It was thought that a million gallons a day could be drawn from the well.

West Cowes (Isle of Wight) Water Supply.—A recent analysis of the water supplied to this town has been made by Mr. John Atfield, who reports thereon as follows:—

One Gallon contains	Grains.
Total solid matter dried at 212° Fahr.	9·0
Free ammonia (none)	0·0
Ammoniacal organic matter, containing 10 per cent. of nitrogen	0·028
Albumenoid organic matter, containing 10 per cent. of nitrogen	0·034
Nitrites (no nitrites), containing about 17 per cent. of nitrogen	0·525
Chlorides, containing 60 per cent. of chlorine	4·55
Hardness, reckoned as chalk grains or "degrees:"—	
Removed on boiling the water	4·0
Unaffected by ebullition	0·4
Total hardness	4·4

Remarks.

This water is superior in quality to the average of drinking waters supplied by public companies to large towns. It is a very good water indeed for drinking and general domestic or manufacturing purposes. (Signed) John Attfield,
Professor of Practical Chemistry to the
Pharmaceutical Society of Great Britain.

Haslingden and Rawtenstall Water-Works.—An extraordinary meeting of the shareholders of the Haslingden and Rawtenstall Water-Works Company was held on the 22nd ult. H. H. Hardman, Esq., presided. Mr. Harper, the solicitor, read the Bury Bill, upon which a few questions were put and answered. The chairman stated that the committee of the Haslingden and Rawtenstall Water-Works Company and the Bury Improvement Commissioners had held a meeting on the question of purchasing the water-works; that they had viewed the works, and that the terms had been agreed upon. In reference to these terms he said the commissioners took upon themselves the mortgage debts and other liabilities of the company, and undertook to pay annuities equal to a dividend which would ultimately reach 4 per cent. on the original shares, and 6 per cent. on the 6 per cent. preference shares. He further stated that the commissioners would take possession on the 1st of January next, after obtaining the Royal Assent. The chairman then moved—"That the Bury Improvement and Water Bill, as amended in the committee of the House of Commons, entitled 'A bill to extend the boundary of the borough of Bury and to confer further powers upon the Bury Improvement Commissioners for the supply of water and other purposes,' be approved by the shareholders of this company." The resolution was seconded by Mr. Richard Calverly, of Preston, and carried unanimously.

Hull Water Supply.—On Thursday week, a special meeting of the Water-Works Committee was held at the town-hall, to consider Mr. Bateman's report. Alderman Chapman was in the chair. The engineer said the report of Mr. Bateman confirmed his No. 1 plan presented to the committee some time ago. Two smaller engines instead of a large one were recommended; and a 3-feet instead of a 2-feet 6-inch pipe from Springhead to the town was recommended. He approved of the proposals. The chairman moved that it be an instruction to the engineer to prepare plans and specifications for two engines of 250-horse power each, with the necessary engine-houses thereto, regard being had to the probable necessity of further engine power being hereafter required, the plans and specifications to be laid before this committee as soon as practicable. It was desirable that the work should be proceeded with as soon as possible, as about two years must elapse before it was completed. Mr. J. Thompson seconded the motion. Mr. Willows moved as an amendment—"That the engineer advertise for tenders for the erection at Springhead of a Cornish engine of 320-horse power, as per plans in his possession, with all the necessary pump-work, loaded valves, &c., to keep up the pressure in the mains for delivering the water direct to the consumers, the connexion with the town mains being made at the cemetery gates. Also to erect an engine-house so arranged that a second engine can be added in case of need." The amendment was not seconded, and the original motion was carried. Messrs. King and Co.'s tender to make and fix a wrought-iron syphon-pipe at Stoneferry for £455 was accepted.

The Proposed Sewage Farm at Walton.—The inquiry before Mr. R. Morgan, the inspector sent down by the Local Government Board, with reference to the proposed compulsory purchase by the Walton Local Board of 104 acres of land belonging to the Earl of Sefton, for the purpose of a sewage farm, was resumed on Saturday, May 4, at the Black Horse Inn, Walton. Mr. Gully, instructed by Messrs. Holden and Cleaver, appeared for the board; and Mr. Potter, instructed by Messrs. Eden and Co., for the Earl of Sefton. The most important witness called on behalf of his lordship was Mr. William Hope, C.E., of London, who has had considerable experience in connection with sewage utilization schemes. He had viewed the site of the proposed farm and the alternative site suggested, and his opinion was that the former presented almost every possible objection that a piece of land could present except as regarded the quality of the soil, whilst the latter was in every way suitable. Probably not more than half of the land proposed to be taken would be available for sewage irrigation, and not less than 1000 yards per acre would have to be removed to an average distance of 50 yards, at a cost of £50 an acre if done by means of wheelbarrows, and of £60 to £65 an acre if done by means of carts. On the other hand, nearly the whole of the land which the earl suggested should be taken would be available for the purposes required, and it could be extended if found necessary. Mr. Hope also expressed the opinion that the cost of obtaining the land wanted by the board, including compensation for severance, tenants losses, &c., would be very much in excess of the cost of the land put forward in the alternative scheme. The counsel on both sides having summed up the evidence, the inquiry terminated. The amount which the board seek to borrow for the purpose of carrying out their scheme is £23,000, in addition to the £20,000 which they had already obtained power to borrow, of which they have spent about £16,000.

Sewage Farms.—The inquiry respecting the application of the Slough Local Board of Health for power to obtain a provisional order authorizing the acquisition by compulsion of land belonging to the Earl of Harewood, for the purpose of a sewage farm, was concluded on Thursday, May 2nd, at the Westminster Palace Hotel, before Mr. Harrison, the Government inspector. Mr. Bateman, C.E., was examined by Mr. Cust against the application. In the course of his evidence he stated that he had inspected the locality, and, although he came to the conclusion that the land proposed to be taken was suitable for a sewage farm, yet, as it was laid out for building, and was situated in a fine country, the cost would be so great that it would be unwise to take the land. He said there was a site adjoining the present Eton Sewage Farm which was suitable for the purpose, and, although the distance was greater, yet the extra cost of conveying the sewage there would be but small in comparison with the compensation that would have to be paid to Lord Harewood. He did not consider £300 per acre an extravagant price for the land, considering its advantages. He expressed an opinion that the sewage farm would contaminate the springs in the neighbourhood, and so cause an injury to the neighbouring farmers, but would express no opinion as to what distance this would be felt. He had seen a great many sewage farms. Some of them were conducted satisfactorily, and some were not. He had seen the sewage running into the sea from Craigentinny Meadows, Edinburgh, as black as when it came on the land. He knew of no system of precipitation which had been successful. So far as he had an opportunity of judging, every plan for the chemical treatment of sewage had failed. At Leamington the water was apparently clear, but it became a greater nuisance than ever. At Cheltenham, a system for deodorization had been abandoned for irrigation. In cross-examination by Mr. Michael, he said he would give no opinion as to whether there would be a nuisance in case a precipitating process was adopted, and the effluent water used for irrigation. Mr. Michael, in reply, urged that the responsibility of getting rid of the sewage was cast upon the local board, and they had adopted the course which was pointed out by the Sewage Utilization Act. It was not competent to consider the general question of sewage farms against precipitation, but only whether the land was suitable under all the circumstances. In whatever direction the board turned they were met by opposition, and they had, therefore, no alternative but to rely upon the Act of Parliament. He said that if the Earl of Harewood would make an offer to the board of some other piece of land not open to the same objection, they would willingly meet him; or if they would offer a small piece of 10 acres for filtration purposes, the board would be ready to take it into consideration. Mr. Cust, on the other side, said Lord Harewood was prepared to make an offer of a piece of land for a tank, but he could say nothing as to the proposition which had been made. He suggested that the present application should be dropped, and that the Earl of Harewood would consider what he could do. Mr. Michael declined to withdraw, and concluded his address by asking for the provisional order which was now applied for. Mr. Harrison intimated that his report would be sent to the Secretary of State, who would communicate to the parties interested in the decision arrived at.

Register of New Patents.

1622.—Mathieu Leon Somze, of Brussels, in the kingdom of Belgium, engineer, for "*Improvements in the construction of joints for water, gas, and other pipes.*" Patent dated June 20, 1871.

This invention consists in forming a perfectly water-tight and gas-tight joint between two tubes or pipes by introducing between the end of one pipe and the inside of the socket of the other pipe to which the first is to be connected an india-rubber or other elastic ring or washer, which when the parts are brought together, and the rubber ring is pressed between them, will closely and tightly fit all round the inserted pipe and form a perfectly tight joint.

In carrying out the invention, the end of the pipe which is to be inserted into the socket of the adjoining one is made slightly conical externally, and at its extreme end is a rounded flange which fits up against the inner end of the socket of the adjoining pipe when the two parts are brought together and are driven home. The sockets are also made slightly conical internally, to correspond with the conical ends of the other pipes, and at the outer extremity of the sockets is made a rounded flange or enlargement with a groove all round the inside thereof. The rings of rubber are made round in section or nearly so, and they are sprung over the flange at the end of the male pipe, and when this latter is inserted in the socket of the adjoining pipe the groove on the inside of the latter will come against the rubber ring and will roll it over and drive it back on the end of the male pipe until the flange of the latter is driven home in the socket. In order to prevent the pipes from becoming accidentally separated, their ends are secured in one another by means of keys which are driven through holes made for the purpose in the outer flange of the socket. When the ends of the pipes have been secured in place, the space between them may be plugged with tow or other suitable substance.

1641.—Edward Thomas Hughes, of 123, Chancery Lane, London, for "*An improved valve for stopping and regulating the supply of water, steam, gas, air, and other similar purposes.*" A communication. Patent dated June 22, 1871.

The valve consists of two opposite cones with cylindrical ends which can be moved nearer to or farther from each other, and the seatings of the cones are formed in a circular shell, having at each side a flange connected to the flanges of the conduit-pipes. The shell is strengthened by outer and inner ribs, the inner ribs being also used to guide and steady the cylindrical ends of the cones, and at one side of the shell there is an aperture or man-hole forming the entrance into the interior of the shell. Between the cones, which are hollow when they are of large dimensions, there is a hollow frame carrying the mechanism for shifting the cones, and under this frame there are holes for emptying the shell when the valve is shut. At the sides of the shell there are tightened rings of gutta percha, lead, wood, or other material to suit the fluids or gases passing through the pipes, and the cones with their cylindrical ends are only turned true at their tightening surfaces. Inside the apex of each cone there is a pipe or socket, one having in it a right-handed screwed thread, and the other a left-handed, and into these threads are fitted corresponding screws at the ends of a rod or bar, to which is fixed a worm wheel geared into a worm on a shaft extending to the exterior of the shell, and kept tight by a gland and packing; and when the worm is turned in one direction the two cones are pressed to the tightening rings, and then the passages are stopped or shut, but when the worm is turned in the reverse direction the passages are opened. The working mechanism is enclosed between the cones, and when motions are required to be faster, bevel wheels are used instead of a worm and worm wheel, and also to ascertain the position of the cones from their seatings an indicator is employed worked either from the worm or bevel wheel shaft.

1713.—William Robert Lake, of the firm of Haseltine, Lake, and Co., Southampton Buildings, London, patent agents, for "*Improvements in mechanism for operating the valves of water-meters.*" A communication. Patent dated July 1, 1871.

This invention has for its object the production of mechanism for operating the valve of a water-meter, which mechanism shall be capable of being actuated to move the valve by means of the pressure of the water itself, and consists in the employment of a flexible or moving diaphragm or piston forming the exterior, or a portion thereof, of one side of a water-case chamber or division in connexion with suitable devices for moving the valve.

1716.—Philip John Davies, of 7, Campsbourne Terrace, Hornsey, in the co. of Middlesex, hydraulic engineer, for "*An improved apparatus for the prevention of damage caused by the bursting of water-pipes in times of frost or otherwise, and for the prevention of water waste generally.*" Patent dated July 3, 1871.

This invention consists of a novel arrangement of a cylinder within which is fixed a hydrostatical bellows, a bucket or other apparatus to rise in the same and carry upon its top a locomotive clack to a seating in the top of the said cylinder so as to form and complete a shut-off valve. Also a retarding valve is used to retard the water and counterpoise the weight of the hydrostatical bellows or carrier and the shut-off valve in the top of cylinder.

1724.—Eloy Nicolas Schmitz, of 23, Boulevard de Strasburg, Paris, engineer, for "*Improvements in gas-engines.*" Provisional protection only obtained. Dated July 3, 1871.

These improvements relate to the employment of compressed air and gas in an engine for producing various mechanical operations. The two elements are admitted, and the gas deflagrated at the same instant, when the volume increases and causes the piston to move. The piston-rod is connected to a block working in an oscillating strap to establish the rotation of the shaft. A

refrigerator is used to condense the spent vapour and to create a vacuum, the water being supplied by pipes leading from a reservoir.

1735.—WILLIAM THOMAS WALKER, of the firm of C. and W. Walker, of the Midland Iron-Works, Donnington, near Newport, Shropshire, and 8, Finsbury Circus, London, for "*Improvements in apparatus used in gas-works for cleansing and purifying gas from ammonia and other impurities.*" (Complete specification.) Dated July 4, 1871. This invention did not proceed to the Great Seal.

These improvements refer to the purification of coal gas from ammonia and other impurities. For the removal of ammonia from coal gas, apparatus called scrubbers, consisting in most cases of circular vessels charged with coke, have heretofore been used. The unpurified gas entering at the bottom, and passing upwards through the interstices of the coke while water or ammoniacal liquor is poured down from the top. Various other methods of bringing coal gas in contact with water or ammoniacal liquor have been tried, but all have proved more or less imperfect. The difficulty of entirely cleansing gas from its ammoniacal and other impurities, without causing very heavy and destructive back pressure, has occupied the attention of scientific men for years past. The effectual spreading of the water or ammoniacal liquor at the top of the scrubber, so that the gas shall not escape coming into perfect contact with it, has always proved a subject of the utmost difficulty. The "Barker's mill" was found to be a very useful means of spreading water, but the necessarily small holes in the horizontal arms soon choke up, sometimes in two or three days only, and thus it soon became impracticable and unserviceable. The same objection applied to all tubes having small holes. All means of spreading or distributing water or ammoniacal liquor have hitherto, from various causes, universally, more or less, failed in accomplishing the object described.

The first part of this invention is a new means invented for effectually spreading the water or ammoniacal liquor to cover or saturate the entire area of the coke, and from experiments made this is accomplished in a very facile and novel manner. On the top of a circular scrubber, about 10 feet diameter, and about 20 feet high inside the body, a circular or square vessel is fixed. Inside this vessel is fitted a capacious water tumbler, which receives the water or ammoniacal liquor from the service-pipe, and when one half or division is full it falls over and discharges its contents into the upper vessel, from whence it rushes down a pipe, which is placed in a vessel sealed downwards to prevent any back escape of gas from the inside of the scrubber. This latter vessel also supports a perforated dash-plate, to be afterwards described, and opens upwards into a larger vessel, which has holes all round its circumference, which are of sufficiently large diameter to prevent their being choked or stopped up. The perforated dash-plate referred to covers the entire surface of the coke to within a short distance of the scrubber sides. This circular plate is perforated all over with holes sufficiently large to prevent their being choked, and inclines downwards to its outer circumference.

The action of the apparatus is as follows:—The half division of the water tumbler having been filled by the water or ammoniacal liquor, and holding, say, about 3 cwts. of water or liquor, tumbles over and discharges the liquor with a rapid rush down the pipe, which fills the perforated vessel, discharging the liquor with considerable force out of the holes in its circumference on to the dash-plate beneath, upon which, from the height, it descends with considerable violence, and the dash-plate, being of thin wrought iron, shakes and trembles like the skin of a drum, and breaks up the water or liquor into minute particles, scattering it in all directions over the surface of the perforated dash-plate and against the sides of the scrubber, thoroughly breaking up the water, and distributing it all over the area of the coke.

It has also another important action or effect. When the perforated vessel is about full of water or liquor, it is arranged to discharge it by preference to within about 9 inches of the sides of the scrubber, breaking up the water and dashing it against the sides and extreme edge of the coke. As the pressure in the vessel gradually declines, the streams of water draw inwards towards the middle of the scrubber, and thus by a natural self-acting process the complete area is covered by the falling water.

The invention described also enables any quantity of water or liquor to be used, as the tumbler will work at any required speed, either very fast or very slow, as the quantity of gas to be purified increases or diminishes; also by a novel method of shifting or removing the centres of the bearings it will work, discharging its contents in any required quantity, either one-eighth, a quarter, half, or three-quarters full, or any other quantity that may be required. Clean water may also entirely be used, or the ammoniacal liquor may be worked over and over again until it acquires any required degree of strength.

The bottom of the scrubber is a steep cone or descent from the centre to the sides, or from the sides to the centre, thus either concave or convex. This constitutes a simple but important part of this invention. For directly the ammoniacal liquor has passed through the coke, by which time it has become a strong ammoniacal solution of a highly volatile character, it at once runs down the sides of the conical bottom clean out of the scrubber entirely. In all scrubbers as hitherto made the bottom has been quite flat, with the flanges of the bottom plates projecting upwards from the bottom, and a considerable quantity of the strong ammoniacal liquor has in consequence been lying in the bottom of the scrubber. From observations and experiments made, the extremely prejudicial character of this construction has been discovered, and it has been found almost impossible to thoroughly purify gas from ammonia from this cause. The great strength the liquor has attained by the time it has reached the bottom of the scrubber has been already explained. Ammoniacal gas, as is well known in chemistry, is exceedingly volatile and diffusive. It is always very difficult to confine it. It has been found that it speedily releases itself to the extent of 35 to 40 per cent. of its strength in the bottoms of scrubbers, and thus the action of the scrubbers as heretofore made has been half neutralized by the rapidly ascending volumes of ammoniacal gas from the ammoniacal liquor in the bottom of the scrubber ascending and diffusing upwards through the coke again, thus constantly spoiling the purification after it has been effected.

It is therefore in order to overcome this difficulty that the steep conical bottom has been invented, as it causes the liquor at once to discharge itself into the proper wells or tanks prepared for it on the gas-works directly it has passed through the coke and reached the bottom. This causes the action of the scrubber to be developed and preserved, and to retain its purifying action and power constantly, all the prejudicial counteracting forces being removed. It is preferred to make the conical bottom of smooth cast-iron plates with flanges beneath.

1745.—JESSE HILDRED, of Batley, in the co. of York, borough surveyor, for "*Improvements in apparatus for ventilating and trapping sewers, and for affording access thereto.*" Patent dated July 4, 1871.

This invention consists in combining manhole covers for sewers with traps and trays for charcoal or other oxidizing agent, the said trap and tray being so situate as to allow free passage of water through the cover to the one whilst the tray is protected from the water. Moreover the tray and trap are made to lift out bodily, either separately or together, and thus afford free access to the sewer.

1749.—MATTHEW WILSON, of Hills Place, Oxford Street, in the co. of Middlesex, wine merchant, for "*Improvements in sink traps.*" Patent dated July 5, 1871.

This invention consists of improvements in Patent No. 3198, dated Nov. 4, 1869, for making the trap therein described self-acting by the following means—namely, inverting the flange and the valve or cover, and placing it beneath the flange. Beneath the valve is affixed in any convenient manner a perforated basin. Beneath the basin or sometimes above it is a spring, spiral or otherwise, sufficiently strong to act upon the basin and valve and force the soft surface, as described, against the flange. The spring rests upon a circular plate with four or more arms resting upon a ledge round the trap. Beneath the plate is affixed the bell as in an ordinary trap. The top or receiver of the trap is to be made of sufficient dimensions to contain a sufficient weight of water to force open the valve. The water then runs as rapidly through into the perforated basin, and as it runs but slowly out of this will keep the valve open sufficiently long to enable the whole of the water in the top of the trap to escape.

In place of the valve as hereinbefore described it is proposed, if convenient, to use a ball of india-rubber, metal, wood, charcoal, or any other suitable material attached in any convenient manner to the end of a lever or otherwise beneath the flange, the lever sufficiently weighted at the end farthest from the ball to close the valve effectually until a sufficient weight of water is in the trap above to force the ball down and allow the water to escape; also with the lever or otherwise a ball may be used, half sphere, or any other shape of rubber or other suitable material filled inside with sponge, rubber, or any other suitable material that will keep the said sphere or spheres or other shape expanded to its proper shape; this is supported in its position by a spring as before described, and acted upon in like manner by weight of water from above. Instead of the springs or levers before mentioned a receptacle is made in the hollow part of the trap for water; in this a float is placed, which is acted on by the water beneath. On the admission of the water the valve or ball is compressed. Or sometimes a hollow washer may be used made of non-porous rubber, or a washer made of sponge rubber, covered or partially covered with non-porous rubber, to be used instead of the ball or washer before described. Sometimes a self-inflating rubber spring on the bellows principle is used to raise the valve, and by the pressure of water from above it is compressed and allows the water to pass; it may be fixed on the rod in connexion with the bell. In Patent No. 3198 reference is made to a float used to raise the valve; now in the present patent the same is used to compress the valve instead of raising it. The object of the trap before described is to make it self-acting, and to prevent any stink or smell coming up from the drain below in connexion with which the trap is laid on.

1754.—JOHN BAKER, of St. Mary's Road, Southampton, in the co. of Hants, for "*Improvements applicable to water-closets for deodorizing and counteracting the noxious effluvia emitted therefrom.*" Patent dated July 5, 1871.

The features of novelty of this invention consist in constructing water-closets with self-closing air-tight lids or covers made hollow, or with a perforated receptacle, to contain animal charcoal or other deodorizing and disinfecting substance.

1783.—ALBERT TIBBITTS, of 41, Lansdowne Crescent, Notting Hill, in the co. of Middlesex, gentleman, and EDWARD FULLWOOD, of 8, Newton Terrace, Lee, in the co. of Kent, cement manufacturer, for "*Improvements in paving streets and paving or covering other surfaces.*" Patent dated July 7, 1871.

According to these improvements coal pitch, coal tar, or other bituminous or asphaltic substance is heated, and fine sand, burnt iron pyrites, or other such like mineral matter in fine powder, is stirred in, also the lime waste of soap and alkali works and soda waste, which, from the alkali they contain, cause a better adhesion between the sand and the other materials; sulphur waste and common salt may also be used. Burnt or raw gypsum is then added, and the whole stirred together. The material, in the form of powder, is then made hot and spread on the roadway or surface, and rammed or rolled with heated rammers or rollers.

1795.—ROBERT SKINNER, of the city and co. of San Francisco, U.S.A., for "*Improvements in the manufacture of artificial stone for pavements, roadways, submarine walls, sewers, pipes, and other similar constructions.*" Patent dated July 8, 1871.

The first part of this invention relates to a new combination of materials to form a concrete block, and consists in the employment of earthy bituminous and pitchy substances combined with calcareous rock, the whole being subjected to a calcining or granulating process by heat, after which the material is formed into blocks by being placed in moulds or dies, and subjected to a high degree of pressure. The second part of the invention relates to the manner of forming the said blocks and laying and cementing them where cementing becomes necessary. In constructing pavements the blocks are bevelled at their top edges and fluted at the sides. After a section of the blocks have been laid down in position they are cemented together by pouring in the heated material prepared as above described, but somewhat reduced in strength by adding a greater portion of the pulverized or granulated calcareous rock.

1797.—THOMAS WHITWELL, of the Thornaby Iron-Works, Stockton-upon-Tees, in the co. of Durham, for "*Improvements in valves.*" Patent dated July 8, 1871.

The invention consists in improvements in valves for regulating the passage of airs, gases, or fluids, where there is danger of such valves being injured by the action of the heat of such airs, gases, or fluids. The valve is made hollow, and constructed with a hollow spindle, so that water may circulate through both the valve and spindle, and the valve is so constructed that all liability to injury through deposition of mud within the valve is removed.

1804.—WILLIAM HOLLINSHEAD, of Peckham, in the co. of Surrey, for "*Improvements in the method of and apparatus for lighting railway carriages with gas.*" Patent dated July 11, 1871.

By this invention the manufacture of gas for the supply of a train may be made in one or more of the carriages, from oil, or other liquid gas-producing substance, by means of the following apparatus, which consists of a retort, by preference of a peculiar form, divided into compartments and set in brickwork, the carriage being protected by metal plates. The oil is supplied from a cistern placed above the retort, and regulated by means of a ball-cock connected to an oil reservoir. A certain proportion of water is admitted with the oil to prevent carbonaceous deposit. The gas passes from the retort to an annular condenser, and thence to a counterbalanced gasholder, which is in the form of a parallelogram, and guided by four internal guide-rods within seal tubes attached to the holder. The tank is also of annular construction. By a series of leaders attached to the holder and feed cock's, the supply of oil to the retort may be regulated. The gas is conveyed to the burners by metal and flexible tubes, and a regulator is applied to each carriage.

1813.—FRANCIS SEWELL COLE, of Thorncliffe, Freemantle, Southampton, in the co. of Hants, gentleman, for "*A new or improved reversible hydraulic machine for raising water and other purposes.*" Patent dated July 12, 1871.

This machine is set in motion by water or other power acting on two or more wheels enclosed in water-tight cases supplied by reservoirs, the whole enclosed in and supported by framework revolving on axle-trees supported on trestles or otherwise, so that the reversal of the machine suffices to renew its action, and it may possibly be made a self-acting machine, although with proportionate loss of power.

1829.—JOHN JOSEPH FRANKS, of Stroud, in the co. of Gloucester, civil engineer, for "*Improvements in the mode of flushing as applied to lavatories, urinals, and water-closets.*" Patent dated July 12, 1871.

The novelty of this invention is that by reason of the guard used the water is fully and fairly distributed over the whole surface of the vessel which is soiled, and it is self-acting, and the water only flows when it is wanted.

1845.—FREDERICK PHILIP PRESTON, JOHN THEODORE PRESTIGE, EDWIN JAMES PRESTON, and WILLIAM ALFRED PRESTIGE, trading under the firm of Josiah Stone and Co., of High Street, Deptford, in the co. of Kent, engineers, for "*Improvements in waste-water preventer taps, so that they shall act without the use of plug-cocks.*" Patent dated July 14, 1871.

These improvements relate to taps from which a limited quantity of water will flow after the key has been turned off. The tap has two valves and a piston, which rises under the pressure of the main supply, and upon which some of the water can get to act upon the piston and force it down with one of the valves upon the seating. The turning of the key in one direction releases only one valve at the time by means of a screw-thread on its end.

1847.—Felix Napoleon Target, of 2, Westminster Chambers, in the city of Westminster, civil engineer, for "*Improvements in dry closets and commodes.*" Patent dated July 14, 1871.

The invention essentially consists in arranging beneath the ordinary opening of the seats of the closets or commodes, boxes which open or move aside when a person sits on the seat, and again close when the person rises, the boxes at the same time sprinkling an absorbing, disinfecting, or deodorizing powder upon the excrement just received by the closet or commode.

1857.—Frederick John Evans, of Clayponds, Brentford, in the co. of Middlesex, civil engineer, for "*Improvements in the purification of illuminating gas.*" Provisional protection only obtained. Dated July 15, 1871.

The object of this invention is to eliminate from illuminating gas the sulphur which it contains as an impurity, and which is volatilized with the hydrogen when the coal is subjected to the process of distillation. To this end, into any convenient part of the pipe which conducts the gas from the retort a jet of superheated steam is admitted, which, by combining with or rather decomposing the sulphur, converts it into a product which can be easily eliminated from the gas by the well-known means, or by the ordinary purifiers.

1859.—Alfred Gardiner Brown, of 63, Trinity Square, in the borough of Southwark, surgeon, for "*Improvements in means of disinfecting water-closets, urinals, as well as gutters and other conduits.*" Patent dated July 17, 1871.

The novelty of these improvements is that a disinfecting or deodorizing liquid is commingled with the water in the downflow pipe, by means of a small pipe passing out of a reservoir into the downflow pipe.

1864.—William Edward Gedge, of 11, Wellington Street, Strand, in the co. of Middlesex, patent agent, for "*Improvements in the formation and joining of bricks for constructing pipes or tubes and other circular or curved brickwork.*" A communication. Provisional protection only obtained. Dated July 17, 1871.

This invention relates to curved bricks having on one face a rectangular groove terminating at one end in a mortise, and on the other a rectangular rib or projection terminating at one end in a dovetail tenon. In joining these curved bricks, they are so placed that the tenon of the rib takes into the mortise of the groove, the next layer of curved bricks breaking joint with the first, and so on. This system of brickwork is intended for the construction of pipes or tubes of any diameter, and curved and circular brickwork generally, and is specially recommended for large syphon-pipes as being much cheaper than the metal syphon-pipes in ordinary use.

1876.—Henry Vaughan, of 78, Monks Road, in the city of Lincoln, engine-fitter for, "*An improved self-acting escape-valve for drawing off the condensed fluids from steam-engines, pipes, and other vessels.*" Patent dated July 18, 1871.

This invention consists in the construction of a self-acting escape-valve, which is actuated by the expansion and contraction of a pipe placed in communication with the pipe or vessel to which the apparatus is applied.

1896.—Archibald Kennedy Irvine, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in apparatus for the safe combustion of inflammable gas, and applicable for mine-lamps for indicating danger, and for signalling.*" Patent dated July 20, 1871.

As applied to a lamp, the invention consists in forming an inlet for air in the bottom of the flame chamber, such inlet being covered with wire gauze or other suitable permeable material, whilst the sides of the chamber are made close and impermeable, or nearly so. The flame will burn silently in the ordinary way as long as air or an inexplosive mixture of air and gas surrounds the lamp; but when an explosive mixture of air and gas is present, the combustion, whilst proceeding quite safely, will be attended with a loud sound. Apparatus may be made like the lamp and with or without lenses or glass sides, of any convenient size, and may be used for burning off inflammable gas, for indicating danger, and for signalling.

1897.—Ferrar Fenton, of Dewsbury, in the co. of York, for "*Improvements in the purification and utilization of sewage and other refuse matters, whether in a liquid, semi-fluid, or solid state, part of which invention is also applicable to other useful purposes.*" Patent dated July 20, 1871.

This invention relates principally to the purification, treatment, and utilization of sewage and other refuse matters, whether in a liquid, semi-fluid, or solid state, and to the production therefrom of various marketable commodities, part of the invention (viz., the aëration used as an adjunct in the purification of liquid sewage) being also applicable to a variety of other useful purposes where the agitation or aëration of liquids is desirable, such as in heating, cooling, and evaporating liquids, &c., and is partly an improvement upon a patent granted to the present inventor and Samuel Hollins, No. 2534, dated Sept. 21, 1870.

APPLICATIONS FOR LETTERS PATENT.

1352.—Henry Edward Newton, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*An improved composition to be used for the manufacture of drain-pipes and other articles, and as a substitute for artificial stone.*" A communication. May 3, 1872.

1355.—William Brookes, of 62, Chancery Lane, in the co. of Middlesex, patent and registration agent, for "*Improvements in means for communicating motion and pressure to parts of presses, cocks, and valves, vices and jacks, which improvements are also applicable in communicating motion and pressure to parts of other apparatus.*" A communication. May 4. 1872.

1359.—George Hayes Carter, of Mottingham Lodge, near Eltham, in the co. of Kent, for "*Improvements in the construction of gas-stoves, applicable for heating public and private buildings, pineries, hot-houses, graperies, and such like buildings and purposes.*" May 4, 1872.

1362.—Robert Fish, of the Hornsey Gas-Works, in the co. of Middlesex, for "*Improvements in the method of and apparatus for revivifying materials used in the purification of gas.*" May 4, 1872.

1378.—William Robert Lake, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in electric torches for lighting gas.*" A communication. May 6, 1872.

1386.—Thomas Morris, of Carlton Chambers, 12, Regent Street, St. James's, London, architect, for "*Improvements in domestic hydraulics.*" May 7, 1872.

1391.—Francis George Fleury, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, and Alfred Tylor, of 2, Newgate Street, in the City of London, brassfounder, for "*Improvements in apparatus for measuring and recording the flow of liquids or fluids.*" May 7, 1872.

1394.—Frederick Ludewig Hahn Danchell, of Horwich, in the co. of Lancaster, civil engineer, for "*An improved filtering medium.*" May 7, 1872.

1411.—Frederick Trotman, of the Zoological Gardens, Regent's Park, in the co. of Middlesex, refreshment contractor, for "*Improvements in reflecting apparatus or fittings for use in lighting up theatres and other buildings.*" May 8, 1872.

1413.—Samuel Swain, of Bradford, in the co. of York, mechanical engineer, for "*Improvements in gas-fittings.*" May 9, 1872.

1414.—William Ross, of Glasgow, in the co. of Lanark, N.B., brassfounder, for "*Improvements in water-closets.*" May 9, 1872.

1420.—Kenneth Henry Cornish, of 22, Market Street, Mayfair, in the co. of Middlesex, for "*Improvements in apparatus used for the manufacture of gas, applicable also to that employed for the distillation of paraffin and other volatile fluids.*" May 10, 1872.

1438.—Frederick Philip Preston, John Theodore Prestige, Edwin James Preston, and William Alfred Prestige, trading under the firm of Josiah Stone and Co., of High Street, Deptford, in the co. of Kent, engineers, for "*Improvements in apparatus for regulating the supply of water to water-closets and other places.*" May 11, 1872.

1457.—William Morris, of the Kent Water-Works, Deptford, in the co. of Kent, engineer, for "*An improved mode or method of and means for establishing a communication with water or gas mains.*" May 14, 1872.

1461.—Walter George Fearnley, of 2, Eardley Crescent, West Brompton, in the co. of Middlesex, manufacturer of gas apparatus, for "*Improvements in apparatus for making illuminating gas, heating apartments or chambers, and other purposes.*" May 14, 1872.

1475.—Robert Allan, of Glasgow, in the co. of Lanark, N.B., merchant, for "*Improvements in reflectors for gas and other lights.*" A communication. May 15, 1872.

1492.—Thomas Christy the younger and Alexander Bobrownicki, both of 155, Fenchurch Street, in the City of London, for "*Improvements in the treatment of ammoniacal liquors of gas-works, in order to obtain valuable products therefrom.*" May 16, 1872.

1500.—William Robert Lake, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus for preventing the escape of foul air and gas from drain-pipes.*" A communication. May 16, 1872.

1511.—Isaac Brown, of Elm Croft Grange, Edinburgh, in the co. of Mid Lothian, N.B., for "*Improvements in watering streets and roads, and in the apparatus or means for effecting the same.*" May 17, 1872.

1529.—James Armytage, of Preston, in the co. of Lancaster, borough surveyor, for "*Improved apparatus for ventilating sewers and drains.*" May 18, 1872.

1532.—William Foulis, of Glasgow, in the co. of Lanark, N.B., civil engineer, for "*An improved exhauster and blower for gas and other aëriform bodies.*" May 20, 1872.

1533.—Joseph Rodney Croskey, of 43, Portsdown Road, Maida Hill, London, Fellow of the Society of Arts, for "*An improved method or process of treating asphalte or bitumen whilst being laid down for pavements and previously thereto, and of constructing pavements having an asphaltic or bituminous surface.*" May 20, 1872.

1545.—Thomas Goode Messenger, of Loughborough, in the co. of Leicester, hydraulic engineer, valve manufacturer, and horticultural builder, for "*Improvements in the coupling of pipes and in the fittings thereof, and in valves to use in connexion therewith and for other similar purposes.*" May 21, 1872.

1577.—Andrew John Murray, of Albany Road, Camberwell, in the co. of Surrey, gentleman, for "*Improvements in the treatment of sewage deposits.*" May 23, 1872.

1593.—Luiz Auguste da Costa, of 35, King Street, Cheapside, in the co. of Middlesex, merchant, and Thomas Lawrie, jun., of 37, Woodstock Road, Shepherd's Bush, in the co. of Middlesex, architect, for "*Improvements in the construction of traps, waste-plugs, or gullies for baths, sinks, drains, and other conduits of water or other fluids.*" May 25, 1872.

GRANTS OF PROVISIONAL PROTECTION.

968.—Jean Joseph Felix Manent, of Ville Franche, department de la Haute Garonne, in the republic of France, now of 60, Boulevard de Strasbourg, Paris, civil engineer, for "*Improvements in pumps.*" April 2, 1872.

1166.—Philippe Rosier, of 82, Boulevard Sebastopol, Paris, France, for "*Improvements in apparatus for emptying or exhausting the conduit or supply-pipes of cisterns and similar structures, as a protection from frost or other damage.*" April 19, 1872.

1180.—Francis George Fleury, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, and Alfred Tylor, of 2, Newgate Street, in the City of London, brassfounder, for "*Improvements in water-waste preventers or apparatus for controlling and arresting the flow of liquids.*" April 20, 1872.

1219.—Arthur Paget, of Loughborough, in the co. of Leicester, for "*Improvements in apparatus for raising, propelling, and distributing water and other liquids.*" April 24, 1872.

1235.—William Cartwright Holmes, of 57, Gracechurch Street, in the City of London, and William Hollinshead, of Peckham, in the co. of Surrey, for "*Improvements in the process of manufacturing gas, and in the apparatus employed therein.*" April 25, 1872.

1261.—Samuel Chandler, sen., Samuel Chandler, jun., and Joseph Chandler, of Southwark, in the co. of Surrey, for "*Improvements in apparatus for cleansing water-closets.*" April 27, 1872.

1262.—John Chadderton, Joseph Allmark, and Benjamin Haigh, of the Alma Bridge Works, Dukinfield, in the co. of Chester, engineers, for "*Improvements in cocks and water-gauges.*" April 27, 1872.

1264.—William Alexander Lyttle, of the Grove, Hammersmith, in the co. of Middlesex, engineer, for "*Improvements in the preparation and utilization of bituminous asphalte.*" April 27, 1872.

1276.—Joseph Beverley Fenby, of Birmingham, in the co. of Warwick, civil engineer, for "*Improvements in apparatus for regulating the flow and pressure of fluids.*" April 29, 1872.

1296.—Robert Boyle, of Glasgow, in the co. of Lanark, N.B., ventilating engineer, for "*Improvements in ventilators and smoke extractors.*" April 30, 1872.

1309.—William Williams Box, of the Crayford Gas-Works, in the co. of Kent, for "*Improvements in apparatus used in the manufacture of gas.*" May 1, 1872.

1316.—James Fielding, of Elm Park, near Liverpool, gentleman, for "*Improvements in steam and water rotatory engines, applicable also for pumping purposes.*" May 1, 1872.

1326.—Edward Craddock, of 3, Fowkes Buildings, Tower Street, in the City of London, engineer, for "*Improvements in the manufacture of pipe-wrenches.*" May 2, 1872.

1327.—Thomas Christy the younger, of 155, Fenchurch Street, in the City of London, gentleman, for "*Improvements in the treatment of ammoniacal and other liquor of gas-works, sewage and other waters containing foreign matters in suspension or solution, in order to obtain useful products therefrom.*" A communication. May 2, 1872.

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1359.—George Hayes Carter, of Mottingham Lodge, near Eltham, in the co. of Kent, for "*Improvements in the construction of gas-stoves, applicable for heating public and private buildings, pineries, hothouses, graperies, and such like buildings and purposes.*" May 4, 1872.

1362.—Robert Fish, of the Hornsey Gas-Works, in the co. of Middlesex, for "*Improvements in the method of and apparatus for revivifying materials used in the purification of gas.*" May 4, 1872.

1378.—William Robert Lake, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in electric torches for lighting gas.*" A communication. May 6, 1872.

1386.—THOMAS MORRIS, of Carlton Chambers, 12, Regent Street, St. James's, London, architect, for "*Improved apparatus and appliances for the water service of buildings and structures.*" May 7, 1872.

1391.—FRANCIS GEORGE FLEURY, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, and ALFRED TYLOR, of 2, Newgate Street, in the City of London, brassfounder, for "*Improvements in apparatus for measuring and recording the flow of liquids or fluids.*" May 7, 1872.

1394.—FREDERICK LUDEWIG HAHN DANCHELL, of Horwich, in the co. of Lancaster, civil engineer, for "*An improved filtering medium.*" May 7, 1872.

1411.—FREDERICK TROTMAN, of the Zoological Gardens, Regent's Park, in the co. of Middlesex, refreshment contractor, for "*Improvements in reflectors or reflecting apparatus or fittings for use in lighting up theatres and other buildings.*" May 8, 1872.

1413.—SAMUEL SWAIN, of Bradford, in the co. of York, mechanical engineer, for, "*Improvements in gas-fittings.*" May 9, 1872.

1414.—WILLIAM ROSS, of Glasgow, in the co. of Lanark, N.B., brassfounder, for "*Improvements in water-closets.*" May 9, 1872.

1420.—KENNETH HENRY CORNISH, of 22, Market Street, Mayfair, London, for "*Improvements in apparatus used for the manufacture of gas, applicable also to that employed for the distillation of paraffin and other volatile fluids.*" May 10, 1872.

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1475.—ROBERT ALLAN, of Glasgow, in the co. of Lanark, N.B., merchant, for "*Improvements in reflectors for gas and other lights.*" A communication. May 15, 1872.

1492.—THOMAS CHRISTY the younger, and ALEXANDER BORROWNICKI, both of 155, Fenchurch Street, in the City of London, for "*Improvements in the treatment of ammoniacal liquors of gas-works, in order to obtain valuable products therefrom.*" May 16, 1872.

1529.—JAMES ARMYTAGE, of Preston, in the co. of Lancaster, borough surveyor, for "*Improved apparatus for ventilating sewers and drains.*" May 18, 1872.

1532.—WILLIAM FOULIS, of Glasgow, in the co. of Lanark, N.B., civil engineer, for "*An improved exhauster and blower for gas and other aëriform bodies.*" May 20, 1872.

INVENTION PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF A COMPLETE SPECIFICATION.

1500.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus for preventing the escape of foul air and gas from drain-pipes.*" A communication. May 16, 1872.

NOTICES TO PROCEED.

3482.—ARTHUR AUCKLAND COCHRANE, of the city of Westminster, in the co. of Middlesex, gentleman, for "*Improvements in the treatment of certain substances for heating and illuminating purposes.*" Dec. 23, 1871.

3503.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in apparatus for generating gas.*" A communication. Dec. 28, 1871.

38.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, major-general, C.B., for "*Improvements in the purification of coal gas.*" Jan. 4, 1872.

87.—JAMES GOWANS, of Edinburgh, in the co. of Mid Lothian, N.B., for "*An improved cesspool for preventing the escape of sewer gases into houses or other buildings.*" Jan. 11, 1872.

89.—BAIL RONALD, brassfounder, and JOHN FARMER, engineer, both of the city of Glasgow, in the co. of Lanark, N.B., for "*Improvements in water-closets and their valves, which are applicable to other purposes.*" Jan. 11, 1872.

95.—ARNOLD BUDENBERG, of the firm of Schäffer and Budenberg, of the city of Manchester, for "*Improvements in liquid-meters.*" A communication. Jan. 11, 1872.

103.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the treatment and utilization of acid gas tars.*" A communication. Jan. 12, 1872.

146.—SAMUEL SIMPSON, of Tottenham Court Road, in the co. of Middlesex, builder, for "*Improvements in water-closets.*" Jan. 17, 1872.

163.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in relief valves, and apparatus connected therewith, chiefly designed for fire-engines, force-pumps, and hydrants.*" A communication. Jan. 18, 1872.

575.—WILLIAM CAMERON SILLAR, of Blackheath, in the co. of Kent, merchant, and ROBERT GEORGE SILLAR, of Bolton, in the co. of Lancaster, gentleman, and CHRISTOPHER RAWSON, of 1, St. Swithin's Lane, in the City of London, general manager of the Native Guano Company, Limited, for "*Improvements in treating and deodorizing human excreta, and thereby facilitating the disposal and utilization thereof.*" Feb. 22, 1872.

617.—JAMES YOUNG, of Kelly, in the co. of Renfrew, N.B., for "*Improvements in treating hydrocarbons.*" Feb. 28, 1872.

618.—JAMES YOUNG, of Kelly, in the co. of Renfrew, N.B., for "*Improvements in apparatus for obtaining hydrocarbons from shale, coal, or other similar substances.*" Feb. 28, 1872.

776.—JOHN SOMERVILLE, of the gas-works in the city of Dublin, gas engineer, for "*Improvements in gas-retort lids and mouthpieces, and machinery for luting the same.*" March 14, 1872.

1005.—WILLIAM WRIGHT, of Sheffield, in the co. of York, plumber, for "*Improvements in valves and apparatus for flushing water-closets and other purposes.*" April 5, 1872.

1095.—DAVID DUNNE KYLE, of 6, Victoria Street, Westminster, for "*Improvements in traps for preventing the escape of foul air and gases.*" April 12, 1872.

1180.—FRANCIS GEORGE FLEURY, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, and ALFRED TYLOR, of 2, Newgate Street, in the City of London, brassfounder, for "*Improvements in water-waste preventers or apparatus for controlling and arresting the flow of liquids.*" April 20, 1872.

1309.—WILLIAM WILLIAMS BOX, of the Crayford Gas-Works, in the co. of Kent, for "*Improvements in apparatus used in the manufacture of gas.*" May 1, 1872.

1327.—THOMAS CHRISTY the younger, of 155, Fenchurch Street, in the City of London, gentleman, for "*Improvements in the treatment of ammoniacal and other liquor of gas-works, sewage, and other waters containing foreign matters in suspension or solution, in order to obtain useful products therefrom.*" A communication. May 2, 1872.

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1500.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus for preventing the escape of foul air and gas from drain-pipes.*" A communication. May 16, 1872.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1316.—JULIUS FRÖLICH, "*Improvements in apparatus for generating gas to be used in gas-furnaces.*" April 28, 1869.

1401.—ERNEST SEYD, "*Improvements in fluid-meters.*" May 7, 1869.

1429.—JOHN WITHERS, "*Improvements in water-meters.*" May 10, 1869.

1477.—ISAAC STOREY, JOHN HENRY STOREY, HENRY LEA, and THOMAS LANE, "*Improvements in means for controlling the discharge of water from standpipes, drinking fountains, and ball-taps or valves.*" May 14, 1869.

1493.—LOUIS ANTOINE VICTOR DUBOURG, "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" May 15, 1869.

1557.—ZEBULON ERASTUS COFFIN, "*Improvements in stop-cocks or valves.*" May 20, 1869.

1572.—WILLIAM HENRY DUPRÉ, "*Improved apparatus for giving light and ventilation to rooms, houses, or other buildings.*" May 21, 1869.

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	23 — 24
5000	20	Bahia (Limited)	20 0 0	3 0 0	11½ — 12½
1000	20	Do., preference	20 0 0	10 0 0	23 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	21 — 23
40000	5	Bombay (Limited)	5 0 0	6 15 0	6½ — 7
10000	5	Do., third issue	4 0 0	6 15 0	1¼ — 1½
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	35 — 36
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19 — 20
120000	10	*Chartered*	10 0 0	10 0 0	16½ — 16¾
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	7 — 7½
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	13 — 14
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	3¼—3½ pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
12000	25	Do., D shares	25 0 0	10 0 0	48½— 49½
17490	100	*Commercial*	100 0 0	10 0 0	167 —170
20000	20	Continental Union	20 0 0	8 0 0	25½— 26½
10000	20	Do., new	10 0 0	8 0 0	3½—4 pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	25 — 26
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16½— 17½
5000	10	Do., preference	10 0 0	6 0 0	11½— 12
6624	10	Do., new shares	10 0 0	7 0 0	13½— 14½
3376	10	Do.	1 0 0	7 0 0	1—1½ pm.
23406	10	European (Limited)	10 0 0	11 0 0	15½— 16½
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	3½—3¾ pm.
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13½— 14½
1560000	100	*Imperial*	100 0 0	10 0 0	169 —171
26000	12½	Do., new shares	12 10 0	7 0 0	16½— 16¾
25000	12½	Do., new shares, 1870	10 0 0	7 0 0	13 — 14
1300	100	Do., bonds	£100	10 0 0	195 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	68½— 69¼
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	66 — 68
3000	10	Do.	10 0 0	5 0 0	7½— 8½
3000	20	Do.	20 0 0	7 10 0	24½— 25½
250000	Sk.	*London*	100 0 0	10 0 0	166 —169
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 —120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
3000	10	Nictheroy, Brazil (Limited)	10 0 0		1½—¾ dis.
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3½— 4½
6000	5	Do., preference	5 0 0	7 0 0	5½— 5¾
20000	5	Mauritius (Limited)	2 0 0	6 0 0	2½— 2⅞
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7½— 7¾
30000	5	Do., new shares	2 10 0	9 0 0	1½—1¾ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2½
17500	10	Pará (Limited)	10 0 0	6 0 0	10 — 10½
27000	20	*Phœnix*	20 0 0	10 0 0	33 — 34
360000*l.*	100	Do., new	45 0 0	7 10 0	14—16 pm.
144000*l.*	Sk.	Do.	100 0 0	5 0 0	88 — 91
5000	20	*Ratcliff*	20 0 0	10 0 0	33 — 35
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	34½— 35½
7359	5	Singapore (Limited)	5 0 0	7 0 0	5 — 5½
2000	5	Do., preference	5 0 0	7 10 0	5½— 6
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	88 — 90
4000	12½	Do.	12 10 0	10 0 0	22 — 24
20000	12½	Do., new shares	2 10 0	10 0 0	5 —6 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16½— 17½
10000	10	Do., new	6 0 0	10 0 0	4½— 5½
9000	4	United General (Limerick)	4 0 0	5 0 0	3 — 3½
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	13 — 14
1500	10	Do.	10 0 0	7 10 0	7½— 8
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
40000	10	Western (Limited) A, B, & C shares	10 0 0	10 0 0	16½— 17½
20000	10	Do., D shares	1 0 0	10 0 0	3¾—4 pm.
16000	5	*West Ham*	5 0 0	9 0 0	7½— 7¾
10000	5	Do., new shares	1 0 0	9 0 0	1½— 1¾
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

Average Composition and Quality of the Metropolitan Waters, in May, 1872.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·17	0·070	0·110	0·002	14·6	3·6
West Middlesex	17·93	0·039	0·147	0·000	15·1	4·0
Southwark and Vauxhall	18·50	0·074	0·120	0·009	15·0	4·0
Chelsea	18·37	0·079	0·147	0·002	14·8	4·0
Lambeth	18·93	0·101	0·111	0·002	15·0	4·0
Other Companies.						
Kent	26·93	0·013	0·217	0·000	20·1	6·0
New River	17·93	0·035	0·131	0·002	14·8	3·8
East London	18·33	0·052	0·166	0·002	15·0	4·2

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was more or less turbid—namely, in that of the Lambeth, the Chelsea, and the Southwark and Vauxhall Companies, that of the Lambeth being very turbid. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 105,457,575 gallons; and the number of houses supplied was 495,677. This is at the rate of 32·3 gallons per head of the population daily. Hy. Letheby, M.B.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	5 15 0	4 17 6	5 10 0	6 5 0	6 12 6
1¼ and 2-inch Socket-pipes	9 12 6	8 12 6	8 10 0	8 17 6	9 2 6
2½ and 3-inch ditto	7 17 6	7 17 6	7 10 0	7 17 6	8 2 6
4 and 5-inch ditto	7 7 6	7 12 6	7 7 6	7 15 0	8 0 0
6 inches and upwards ditto	6 7 6	7 7 6	7 2 6	7 10 0	7 17 6
Retorts, 1st fusion, hot blast	8 2 6	7 2 6	6 17 6	7 12 6	8 2 6
Ditto, 2nd ditto, cold ditto	9 2 6	8 2 6	7 17 6	8 12 6	9 2 6
Tank-plates, ¼ thick and above	8 12 6	7 12 6	7 7 6	8 2 6	9 12 6

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign.*—	Per Keel.
	s. d.		
Chatham and Rochester	9 0	Barcelona	£22 0
Cork	9 6	Bordeaux	9 0
Dover, Folkestone, & Ramsgate	7 6	Boulogne and Calais	8 15
Dublin	9 6	Cadiz	£11 to 11 10
Exeter Quay	9 0	Cronstadt	£12 to 12 10
Ipswich	6 6	Copenhagen	10 0
London (from Leith)	—	Genoa	20 0
London (Pool)	6 3	Hamburg	8 0
Lowestoft and Yarmouth	5 6	Havre de Grace	9 10
Portsmouth & Southampton	7 0	Leghorn	19 0
Plymouth	7 0	Lisbon	11 5
Shoreham	8 0	Rotterdam	8 10
Whitstable	7 0	Stettin	11 10
Weymouth	7 6	Trieste	20 10
		Venice	22 10

Advertisements.

TURNER & ALLEN,

201, UPPER THAMES STREET,

London,

GAS & WATER ENGINEERS.

CONTRACTORS FOR THE SUPPLY OF

LAMP COLUMNS, LANTERNS, FOUNTAINS, PIPES, &c.,

TO

GAS, WATER, & RAILWAY COMPANIES, LOCAL BOARDS, SHIPPERS, &c.

Complete Pattern and Price Book, 3s. 6d. post free.

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

LESSEES:

LESMAHAGOW AND LONGLEE COAL COMPANY,

Office—5, DIXON STREET, GLASGOW.

Works—BLACKWOOD & SOUTHFIELD, LESMAHAGOW.

English and Foreign Agents:

JAMES MILLER, SON, & Co.,

1, GREAT ST. HELEN'S. LONDON, E.C.,

AND

75, UNION STREET, GLASGOW.

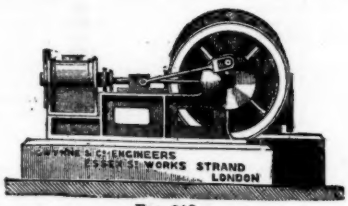

Fig. 213.

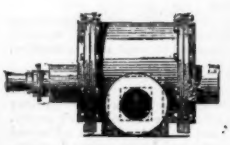

Fig. 211.

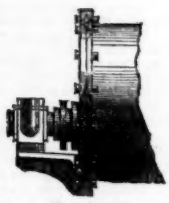

Fig. 219.

GWYNNE & COMPANY,

HYDRAULIC, MECHANICAL, & GAS ENGINEERS,

ESSEX STREET WORKS, STRAND,

London, W.C.,

SOLE MANUFACTURERS OF

BEALE'S IMPROVED PATENT GAS-EXHAUSTER,

Under the personal superintendence of Mr. BEALE.

REDUCED PRICES AND INCREASED CAPACITY.

Also manufacturers of Improved Hydraulic Regulators, to actuate a steam or gas throttle-valve to suit the make of gas; self-acting bye-pass valves, to move by hand or otherwise; improved stop-valves, with faced flanges, forming the neat adjunct to Exhauster of valve and elbow combined. Exhausters manufactured on the new principal have given the utmost satisfaction, and can be seen working at several large Gas-Works in London. G. & Co. are now engaged in manufacturing the largest Gas-Exhausters in the world, with engines complete.

The Gas-Exhausters may be made with inside or outside bearing, as shown in Figs. 211 and 219.

Fig. 213 shows the Improved Gas-Exhauster attached to, and driven by one of Gwynne and Co.'s well-known high-speed Horizontal Steam-Engines, without any intermediate gearing. This arrangement is extremely compact, and is beautifully adapted for small or large Gas-Works, and the foundations and erection are both very simple and inexpensive.

Prices and every information upon application to Gwynne and Co. *as above.*

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

The superior quality of this well-known Cannel, as wrought by

THE NITSHILL AND LESMAHAGOW COAL COMPANY,

Is now generally admitted by all Gas Engineers.

PRICE AND ANALYSIS MAY BE HAD ON APPLICATION TO

JAMES M'KELVIE, HAYMARKET, EDINBURGH.

BOROUGH OF HUDDERSFIELD.

WATER-WORKS MANAGER.

WANTED, by the Corporation of Huddersfield, a WATER-WORKS MANAGER; salary £150 per annum, with house and rates free.

Applications (with copies only of testimonials, which will not be returned) to be sent in to the Town-Clerk, Huddersfield, on or before the 6th of June. No personal canvassing of the Council permitted.—By order,

May 23, 1872. JOSEPH BATLEY, Town-Clerk.

BOROUGH OF MIDDLESBROUGH.

TO GAS MANAGERS, &c.

WANTED, by the Corporation of Middlesbrough, a GAS MANAGER for their works, the present make of which is 105,000,000 cubic feet of gas per annum. The person appointed will be required to devote the whole of his time to the duties of his office, and will be expected to enter thereupon on the 1st of July next. Three months notice to terminate the engagement, to be given or taken, as the case may be.

Applications, stating salary expected, and marked outside "Application for Gas Managership," to be sent to the undersigned before noon on the 15th of June.

JOHN T. BELK, Town-Clerk.

Corporation Hall, Middlesbrough, May 29, 1872.

TO GAS COMPANIES.

WANTED, by the Advertiser, an appointment as MANAGER or ASSISTANT MANAGER of a Gas-Works, or Gas and Water Works. Has a good practical knowledge of the erection of new and extension of old works, also the manufacture and distribution of gas, gas-fitting, repairs to meters, and laying of mains. Has been several years abroad. Good testimonials and references.

Address O. K., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SECRETARY AND MANAGER.

WANTED, by the Redhill Gas Company, a gentleman capable of undertaking the MANAGEMENT of the works. Must also have a knowledge of book-keeping and the general routine of office work. Salary £150 per annum.

Address, stating age and present employment, to WM. STENNING, Esq., Chairman, Redhill, SURREY.

BAHIA GAS COMPANY.

WANTED, a Clerk who understands book-keeping and gas-fittings, to proceed to Bahia, Brazil, in the latter part of June or beginning of July. Age not to exceed 30. Salary £180 per annum.

Apply by letter only, in own handwriting, on or before June 12, enclosing testimonials (copies only), to Bahia Gas Company, Limited, 10, Coleman Street, London, E.C.

May 27, 1872. ALFRED J. HEAD, Secretary.

TO GAS COMPANIES, TAR DISTILLERS, &c.

WANTED, to purchase in quantities, Anthracene, Pitch, Naphtha, and other Tar products.

Address, in first instance, stating prices and quantities, to be delivered in Manchester and London, to "Manufacturers," care of MESSRS. SAMPSON WISH AND CO., 3, Paradise Street, SHEFFIELD.

WANTED, a re-engagement as Working MANAGER of a Gas-Work. Thoroughly understands the manufacture of gas, laying mains, services, fixing meters, &c. Unexceptionable references.

Address J. MAY, 151, Vauxhall Bridge Road, LONDON.

WANTED immediately, by the Blaenavon Gas and Water Company, Limited, a FOREMAN. He must understand the management of retorts, gas-fittings, and main laying. House and coal found.

Apply by letter or personally, stating age and salary, to Mr. JOHN HARRIS, Secretary, 17, Broad Street, Blaenavon, near PONTYPOOL.

COLCHESTER GAS COMPANY.

WANTED, a Foreman who has a practical knowledge of gas-making. Wages 28s. a week, with house and small garden, coals, and gas.

Applications, with testimonials as to ability and character, must be sent to the Chairman of the Company by the 12th of June inst. J. B. HARVEY, Chairman.

Colchester, June 1, 1872.

TO GAS COMPANIES.

WANTED, by a thorough good practical MAN, a situation as GENERAL FOREMAN or MANAGER. The best of testimonials can be had, and security given if required. No objection to go abroad.

Address A. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COOKING AND HEATING BY GAS,

BY

MAGNUS OHREN, A.I.C.E.

NEW AND REVISED EDITION,

Prepared for Gas Companies to circulate amongst their gas consumers.

£1 per 100; £3 15s. per 500; or £6 per 1000.

Address, MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

WANTED, a second-hand Station-Meter, by the Morley Gas Company, near Leeds, to register from 20,000 to 30,000 cubic feet of gas per hour.

Address, with full particulars, to WILLIAM WILSON, Secretary.

TO GAS COMPANIES.

WANTED, to lease a Gas-Work where the make is not less than 3,000,000 feet per annum.

Address ROBERT DEMPSTER, Engineer, Elland, near Halifax, YORKSHIRE.

ESTIMATES WANTED.

THE Forfar Gas Corporation are prepared to receive ESTIMATES for CONDENSERS and PURIFIERS, &c.; also Steam-Engine, Boiler, &c.

Plans and specifications to be seen at the Manager's Office, Gas-Works, Forfar, with whom offers are required to be lodged on or before June 15, 1872.

Forfar, May 18, 1872. WILLIAM GORDON, Clerk.

TO MANUFACTURERS OF IRON-PIPES, MAINS, RETORTS, AND FIRE-BRICKS.

A London firm having a large connexion amongst Gas Companies is desirous of undertaking first-class Agencies.

Address LIONEL, Deacon's, LEADENHALL STREET.

THE Advertiser, who has had many years experience, is desirous of obtaining the Management or Lease of a Gas-Work, or would invest capital in the erection of new works.

Address 7, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A Situation wanted by the Advertiser, aged 22, who has had good experience in drawing, gas accounts, and gas affairs generally, as Draughtsman, or Draughtsman and Clerk, in an Engineer's Office, or as Assistant Manager in a Gas-Work.

Address A. M., care of Alfred Penny, Esq., Wenlock Iron-Works, WHARF ROAD, N.

FOR SALE, a Second-hand Station-Meter, suitable for small works, capable of passing about 4000 cubic feet per hour.

Apply to MANAGER of Gas-Works, Newton Abbot, SOUTH DEVON.

FOR SALE, one Dry Lime Purifier, 12 ft. by 8 ft. by 4 ft. deep, with wrought-iron cover, valves, and 6-inch connexions.

For price, apply to JOHN WILSON, Gas-Works, ABINGDON.

FOR SALE, a Set of Four Purifiers, nearly new, 4 ft. square, with centre-valve, covers, and 6-in. connexions complete. Also Two Cup Valves.

May be seen (or particulars furnished) on application to the MANAGER, Gas-Works, LURGAN.

FOR SALE, a Vertical Condenser, consisting of 12 double rows of 6-in. pipes, with arch pipes, bottom box 12 ft. 6 in. long, tar pipe, and dip bucket, all in good condition.

For price and further particulars, apply to H. CRANMER, Manager, Gas-Works, STRATFORD-UPON-AVON.

FOR SALE, a Station-Meter in square case, 4 ft. 6 in. by 4 ft 6 in., by James Milne and Son, Edinburgh; also six oval Mouthpieces, 14 in. by 17 in.

Apply to G. T. MYERS, Manager, Gas-Works, Broughty Ferry, near DUNDEE.

HALIFAX CORPORATION GAS-WORKS.

TO BE SOLD, by Tender, a Gasholder, 70 ft. in diameter by 21 ft. deep, having four sets of guide columns, two columns to each set. The holder is in good working order, and has been thrown out of use this spring in consequence of the erection of a new large gasholder.

Further particulars may be obtained on application to Mr. G. D. Malam, Manager of the Gas-Works, and tenders stating the price offered must be sent to me, endorsed "Tender for Gasholder."—By order,

A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, May 22, 1872.

ASHBURTON GAS-WORKS.

TO BE LET BY TENDER, from Midsummer next, for a term of Seven years, determinable at the end of the first three or five years thereof, THE ASHBURTON GAS-WORKS. The Railway Station adjoins the works. For all particulars, and for terms of Letting, apply to the Secretary, Mr. R. G. ABRAHAM, Solicitor, Ashburton, DEVON, to whom written tenders, stating proposed rent, should be delivered or sent on or before the 6th of June next. The highest or any tender will not necessarily be accepted.

Dated May 11, 1872.

TO BRICKLAYERS AND BUILDERS.

THE Directors of the Cottenham Gas Company are desirous of receiving TENDERS for the erection and completion of a GASHOLDER TANK, plans and particulars of which may be had of W. Wood, Engineer, 41, Sidney Street, Cambridge, or of the Company's Secretary, Cottenham.

The Directors do not bind themselves to accept the lowest or any tender.

H. FRANKLIN, Secretary.

Cottenham, May, 24, 1872.

TENDERS FOR GAS COAL.

THE Directors of the Ratcliff Gaslight and Coke Company are prepared to receive TENDERS for the supply of about 18,000 tons of best GAS COAL, of which a specification may be obtained on application to the Engineer, at the works, New Crane, Wapping, E.

Tenders to be sent in, endorsed "Tender for Coal," on or before the 18th day of June, 1872, to the Secretary, at the Company's Offices, 345, Cable Street, London, E.

The Directors do not bind themselves to accept the lowest or any tender, but the person or persons, whose tender may be accepted, will be required to execute an agreement prepared by the Company's Solicitors, for the due performance thereof.

June, 1872.

TENDERS FOR COAL.

THE Directors of the Cambridge University and Town Gaslight Company are desirous of receiving TENDERS for the supply of 8000 tons of GAS COAL; the whole to be delivered within twelve months, in such quantities as may be required by the Gas Company, in trucks, on to their siding joining the Great Eastern Railway at Coldham's Lane, Cambridge. The contract to commence on the 15th of the present month.

The Coal to be the best of its kind, and as free as possible from sulphur, bats, refuse, and dirt. Payments to be made monthly so long as the contract shall be duly fulfilled.

Sealed tenders, specifying the description of Coal and the pits at which it is to be raised, to be sent to the Gas Company's Office, on or before Monday, the 10th of June, stating price per ton of 20 cwt., subject to the conditions aforesaid.

The respective contracting parties will be required to execute an agreement to be prepared by and to the satisfaction of the Secretary of the Company.

By order of the Directors,

June 1, 1872. W. WOOD, Manager.

THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the City Terminus Hotel, Cannon Street, London, on TUESDAY, the 28th inst.—Philip Twells, Esq., the Chairman—when the following Resolutions were passed:—

Resolved unanimously—"That the report upon the affairs of the Association now read be received, adopted, and entered on the minutes."

Resolved unanimously—"That a dividend of £2 per share be declared upon the 56,000 shares of the Association, for the half year ended the 31st of December last; and that the said dividend be payable, free of income-tax, on and after the 15th of June next."

Resolved unanimously—"That Benjamin Attwood, Esq., be re-elected a Director of the Association."

"That Philip Twells, Esq., be re-elected a Director of the Association."

"That James Helme, Esq., be re-elected a Director of the Association."

"That Thomas Newton Stokes, Esq., be re-elected an Auditor of the Association."

"That the cordial thanks of the meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair this day."

Upon the motion of the Chairman, Mr. Philip Twells, a vote of thanks was also accorded to Mr. G. W. Drory, the General Superintendent, and the other officers of the Association. By order of the Board of Direction,

ALBERT F. JACKSON, Secretary.

30, Clement's Lane, Lombard Street, London, May 29, 1872.

BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR GAS COALS.

THE Directors of the above Company invite TENDERS for the supply of 2000 tons of Screened GAS COAL, as free from sulphur as possible, to be delivered in trucks free at Brettell Lane Station, and 200 ditto to be delivered at Round Oak Station, Great Western Railway, between the 1st of July, 1872, and the 30th of June, 1873. Rates of delivery subject to arrangement. Terms of payment monthly in cash, less 2½ per cent. discount.

Tenders to be addressed to the Secretary, and endorsed "Tender for Gas Coal," on or before the 15th of June inst.

The Directors do not bind themselves to accept the lowest or any tender.

Gas-Works, Brierley Hill, June, 1872.

TO COAL AND CANNEL PROPRIETORS.

THE Directors of the Cheltenham Gaslight and Coke Company invite TENDERS for the supply of the best quality of CANNEL and COAL for making Gas in the district affording the supply, for One, Two, or Three years, from the 1st of July next.

For quantities, particulars, and conditions of contract, application to be made to the Company's Engineer.

Sealed tenders, addressed to the Engineer, must be forwarded on or before Thursday, the 6th proximo.

R. O. PATERSON, Engineer.

Gas-Works, Cheltenham, May 9, 1872.

SWANSEA GASLIGHT COMPANY.

CONTRACT FOR GAS COALS.

THE Directors of this Company invite TENDERS for the supply of 10,000 tons of the best GAS COALS, during the twelve months ending the 1st day of July, 1873, in such monthly quantities as is hereby specified:—

July, 1872	500 tons.
August, 1872	600 ,,
September, 1872	800 ,,
October, 1872	900 ,,
November, 1872	1200 ,,
December, 1872	1200 ,,
January, 1873	1000 ,,
February, 1873	1000 ,,
March, 1873	900 ,,
April, 1873	800 ,,
May, 1873	600 ,,
June, 1873	500 ,,

The Coals are to be the best of their several kinds, to be as free as possible from sulphur, bats, bind, refuse, and dirt. To be delivered dry and in good condition, free of all rates and charges, on to the Company's weigh-bridge at the Gas-Works, Swansea.

Terms of payment on or about the 14th day of each month, in cash, less 2½ per cent. discount.

The South Docks are within 160 yards of the gas-works, and rails are laid from the works in direct communication with the whole of the narrow-gauge system.

Each tender must state the prices per ton; quantities and description of Coals proposed to be delivered; whether screened large, rubble, through and through, nuts or cobbles; and the veins from which the Coals are worked.

The Directors reserve to themselves the right of accepting or rejecting one or more tenders for the supply of a portion or the whole quantity of Coals required; and likewise they do not bind themselves to accept the lowest or any tender.

Inquiries may be made, and sealed tenders be addressed and sent in to me, the undersigned, on or before Tuesday, the 25th day of June next.

THORNTON ANDREWS, Secretary and Manager.

Swansea Gas-Works, May 23, 1872.

Demy 8vo., half bound roan, cloth sides, lettered, price 7s. 6d., by post 8s.,

THE

GAS MANAGER'S HANDBOOK,

CONSISTING OF

TABLES, RULES, AND USEFUL INFORMATION

FOR GAS ENGINEERS, MANAGERS,

AND OTHERS ENGAGED IN THE

MANUFACTURE AND DISTRIBUTION

OF

COAL GAS.

BY THOMAS NEWBIGGING, A.I.C.E.

W. B. KING, 11, BOLT COURT, FLEET STREET.

HENRY SKOINES

Is prepared to undertake, by Contract or otherwise, the

SETTING OF EVERY DESCRIPTION OF

RETORTS, STEAM BOILERS, &c.,

With great economy of fuel and durability of workmanship.

GAS-WORKS LEASED OR REPAIRED BY YEARLY CONTRACT.

7, ARGYLE STREET, KING'S CROSS, W.C.

THE PATENT RIBBED GAS-RETORTS

Are in Use at over 150 Gas-Works,

And continue to give entire satisfaction. Circulars, with prices and testimonials, will be sent on application to

A. C. FRASER, GAS-WORKS, MIDDLESBROUGH.

TO GAS COMPANIES, ENGINEERS, CONTRACTORS, AND OTHERS.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,

BRASS FOUNDER AND FINISHER,

MANUFACTURER OF

IMPROVED WET AND DRY CONSUMERS GAS-METERS,

LAMP METERS AND BOXES,

GOVERNORS, GAUGES, INDICATORS, EXHAUST & PRESSURE REGISTERS,

GAS STATION-METERS,

With all the joints planed.

TERMS, &c., ON APPLICATION.

WILLEY & FORD,

GAS ENGINEERS, EXETER,

Having completed their NEW WORKS in the COMMERCIAL ROAD, for the supply of every description of GAS APPARATUS, respectfully invite the attention of GAS COMPANIES and others to their various Manufactures, especially appertaining to GAS-WORKS.

ENGINEERING DEPARTMENT.

They have lately had the pleasure of ERECTING NEW GAS-WORKS and LIGHTING the following towns:—

Chagford, Holsworthy, and Northtawton, Devon; Chard and Chardstock, Somerset; Trecastle, Brecknonshire; and Finchcox, Kent.

They have also executed many improvements and extensions at the following Gas Companies Stations:—BIDEFORD, DAWLISH, DEVONPORT, DARTMOUTH, EXMOUTH, ILFRACOMBE, LISKEARD, ST. AUSTELL, WELLINGTON, DUBLIN, BRECON, CARDIGAN, PONTYPOOL, TOTNES, TRURO, &c., to either of which they refer with much confidence, and the most satisfactory testimony will be given of the manner in which the various works have been executed.

TOWNS or VILLAGES not yet supplied can be lighted with gas at a moderate cost.

PLANS and ESTIMATES furnished and Gas Companies advised on improvements, extensions, and alterations of works.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their DRY METERS, over 2000 being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

GAS-FITTING DEPARTMENT.

An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

☞ *Please note the Address—*

GAS ENGINEERING WORKS, COMMERCIAL ROAD, EXETER.

TO TAR DISTILLERS, &c.

THE Directors of the Kingston-upon-Thames Gas Company are prepared to receive TENDERS for the surplus TAR produced at their works at Kingston, from July 1, 1872, to June 30, 1873. Quantity about 60,000 gallons. Tenders to be at per gallon f.o.b. the Contractor's barge.

Further particulars may be obtained from Mr. Watson, Manager, at the works.

Tenders to be sent to Mr. W. A. Fricker, Secretary, Gas Offices, Church Street, Kingston, on or before the 25th of June inst., endorsed "Tender for Tar."

The Company do not pledge themselves to accept the highest or any tender. By order,

W. A. FRICKER, Secretary.

Gas Offices, Kingston, June 1, 1872.

BOROUGH OF SWANSEA.

TO CAPITALISTS, CONTRACTORS, AND OTHERS.

THE Swansea Local Board of Health are prepared to receive TENDERS for the supply of GAS for a term of not less than Ten years.

The Contractor or Lessee to provide and lay down, at his own expense, the necessary mains, and connect the same with the Lamp Pillars and Lamps of the Local Board.

No new Act of Parliament is required, as the Local Board, or their Contractor or Lessee, are already empowered by statute to break up the streets and lay the pipes, and, subject to the lighting of the streets or any of them, to supply private consumers, and recover the Gas Rents.

The population of the borough is 52,000.

For particulars and forms of tender, apply to Mr. Edward Cousins, Surveyor, Guildhall, Swansea.

Sealed tenders, marked "Gas Tender," to be delivered by post, addressed to "The Town-Clerk, Swansea," not later than Monday, the 8th day of July, 1872.

RICHARD AUBREY ESSERY, Town-Clerk, &c.

N.B.—The Corporation have land contiguous to the Docks, and at the lowest level, which might be treated for by any new Gas Company.

Guildhall, Swansea, May 13, 1872.

TO BUILDERS, IRONFOUNDERS, AND CONTRACTORS.

THE Directors of the Wigan Gas Company are desirous of treating for the supply and erection of the following:—

Contract No. 1.—For the erection of new Purifying and lime Shed, supported by iron columns, &c. Station Meter House, Foundations for Plant, &c.

Contract No. 2.—For the supply and erection of Four Purifiers, 20 feet by 16 feet, with wrought-iron lids and air-valves, five tiers of wood sieves, lifting crabs, valves, and connexions.

Contract No. 3.—One Scrubber on "Mann's" principle, 10 ft. diameter, 30 ft. high, with necessary arrangements for distributing liquor; valves, connexions, &c.

Contract No. 4.—One Station Meter, 10 ft. square, to pass 30,000 cubic feet per hour, with bye-pass, valves, and connexions.

Drawings and specifications may be inspected at the Offices of the Company, Chapel Lane, Wigan; and Tenders, addressed to the Directors, must be sent to the Offices, or to me, on or before the 17th of June next.

The Directors do not bind themselves to accept the lowest or any tender

R. A. DARLINGTON, Law-Clerk to the Company.

Wigan, May 29, 1872.

ROBERT MACLAREN and CO.,

EGLINTON FOUNDRY, GLASGOW,

Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

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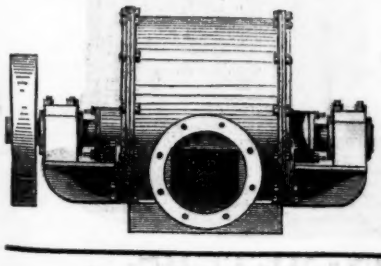

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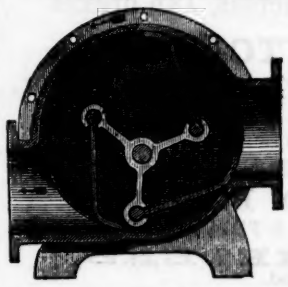

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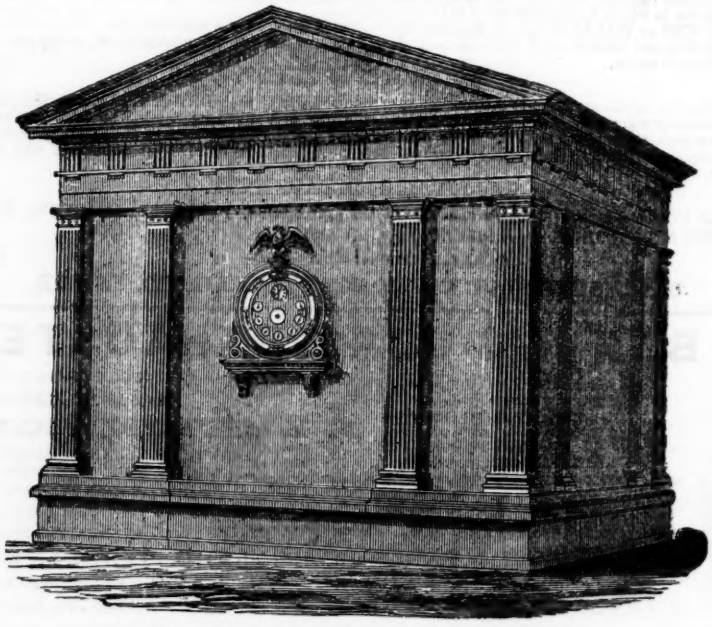

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CONTENTS.

	Page
Notes upon Passing Events:—	
The Duke of Bedford and Covent Garden Market	525
The Ecclesiastical Commissioners and the Finsbury Estate	525
The Corporation of London and Wasted Revenues	526
Waterloo Bridge	526
The Tunbridge Wells Sewage Farms	526
The Report of the Engineer of the City Commissioners of Sewers	526
The Doings of the London School Board and the Charitable Endowment Commission	527
The Bill to Regulate Inquiries by the Board of Trade	527
Circular to Gas Companies:—	
The Meeting of the British Association of Gas Managers	527
Mr. Jones "On the Various Methods of Collecting Gas Accounts"	527
Mr. Mellor "On Eveleigh's System of Gas Manufacture"	528
The Home Office and the Purchase of the Ryde Gas-Works	528
The Duties of the Gas Referees	528
The Report of the Paris Gas Company for 1871	528
Correspondence:—	
Patent Gas	529
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	529
Progress of Bills in the House of Commons	529
Miscellaneous News:—	
Meeting of the Malta and Mediterranean Gas Company	530
British Association of Gas Managers	531
Dr. Whitmore's Report on the Quality of the Water supplied in St. Marylebone, in May, 1872	540
Dr. Whitmore's Report on the Quality of the Gas supplied in St. Marylebone, in May, 1872	540
The Gas Question at Deal	540
The proposed Purchase of the Ryde Gas-Works	540
Gas Supply of Hull	540
Dundee Gas Revenue and Expenditure	540
Complaints as to increased Cost of Gas at Aberdeen	540
Gas Supply of Batley and Dewsbury	540
Gas Supply of Bury, Lancashire	540
The Harrow Gaslight and Coke Company	540
Torquay Gas Company	540
Middlesborough Corporation Gas-Works	540
The Price of Gas at Heywood	540
The Gryfe Water Supply	540
Sewage Farming at Tunbridge Wells	541
Nine Hours Movement among Gas-Tube Makers	541
Suffocation by Gas in a Bed-Room	541
Disputed Gas Bill at Leeds	541
Serious Gas Explosion at Tunbridge	541
Liability of a New Tenant for Arrears of Gas-Rental	541
Curious Compensation Case	541
Failure of a Gas-Rate at Ogley Hay	541
The Rise in the Price of Coal	542
Exhausting Machinery	542
Proposed Purchase of the Sunderland and South Shields Water-Works	542
Bristol Water-Works Company	542
Water Supply of Kettering	542
The Leamington Sewerage Works	542
Polluting Streams	542
Register of New Patents:—	
Applications for Letters Patent	542
Grants of Provisional Protection	542
Notices to Proceed	543

TO CORRESPONDENTS.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 18, 1872.

Notes upon Passing Events.

The Duke of Bedford is dead! Another duke reigns and governs in his stead: a man of the world, educated by life in the army and in the House of Commons, succeeds a recluse. This to a large section of London is nearly as important as the succession of a new monarch in a despotic Government, or, perhaps, to use a less grandiose simile, the arrival of a new prefect in a French department. The reason is simple. The Duke of Bedford owns a large and important quarter of London, which bears in its squares and its streets the various names connected with his family. He owns one market—Covent Garden—and its precincts, the only one which has ever been heartily supported by the vendors of the best fruit and vegetables. The late duke, who had never mixed in society of any kind for more than twenty years, if he took the trouble to see or hear at all, saw only with the eyes and heard only with the ears of his steward or his professional advisers, his lawyers, his surveyors, his architect—a class of men—there are exceptions—who are apt to look at every property question in the light of an investment. The present duke has had every opportunity of learning what is due from the house of Bedford. We may expect to see, in spite of the opposition of the inhabitants, some active attempt to open up a communication by night, as well as by day, between the line of Holborn and the series of railway stations that line the Euston Road. We may also reasonably hope that Covent Garden may be adapted to the demands of the London that has grown up in forty years. The Corporation of London have wisely paused, before sinking another quarter of a million in market improvements and constructions, to learn what the lord of Covent Garden will do. At present the limited extent of the vegetable market confines the unloading of the vans of market gardeners to very early hours. The greengrocer who has exhausted his first stock cannot get a second supply in the course of the day; while the waggons of cabbages, &c., that were too late, are spoiling at vast expense in some heavily rented back yard. The additions to Covent Garden have been in shreds and patches. The whole market requires considering and rebuilding on a comprehensive plan; the church pulled down, and erected in a better situation. The retail and splendid fruit shops should be abolished, or removed to the outside of a new market square. A roof of slate and glass, 30 or 40 feet high, should cover the whole "garden" devoted to stalls, with avenues through which vans and waggons could unload and pass on, and all the conveyances of costermongers stand sheltered from the weather. We must not start back in genteel affright at the word costermonger. The fact is that nine-tenths of London are supplied with fruit and vegetables by that industrious and enterprising class. At present they stand waiting in hundreds, we might say thousands, exposed to all weathers. It is true that the Bedford estate is building a flower market, but that is only a step in one direction. We hope to see the whole of the present market levelled to the ground, and all the piazza, except the hotels, or such of them as do a profitable business, and an architect of common sense, not mad with æsthetic ideas, like the gentleman who ruined Columbia Market, employed to construct a covered market equal to the demands of at least one-half of the metropolis. The rulers of the Bedford estate have hitherto been too often unapproachable mayors of the palace. We trust that the reign of Hastings, Duke of Bedford, may be as remarkable and as popular as that of Duke Francis, and that the present may do as much for markets as the former did for agriculture.

The late Marquis of Westminster, one of a family not famed for lavish generosity, has shown, in the reconstruction of Pimlico, how much more may be done in public improvements by one great landed proprietor of large far-sighted views, than by any Ædile or rate-supported Board. The same lesson may be read in Cardiff Docks and in the rows of Chester. Whatever may be the disadvantages of widely spreading and continually increasing agricultural estates under the rule of a pauper or a millionaire fanatic, there is no doubt that in town, improvements are made easier from having to deal with large blocks owned by one proprietor.

In that signal failure—in succession to a great success—the story of Lord Bantam, that followed the famous "Ginx's Baby," Mr. Jenkins makes the 99 years leases of London estates a great grievance; but it will be difficult to make out this theory after comparing the condition of the Grosvenor, the Bedford, and the Portland estates with the freehold building sites of London. To be sure, there is Paris, with its debt and its taxes, and all the political difficulties temporarily assuaged by an Emperor and a Hausmann. If we want an example of thoroughly bad management, we must turn to estates of ecclesiastical corporations, which are, unfortunately, quite beyond the reach of public opinion. The Finsbury estate is a signal example of what can be done by a mysterious institution, which has no soul to be saved, no body to be kicked; which is inaccessible to remonstrance and indifferent to criticism; which is, in fact, a Board—that is, according to Jeremy Bentham, a screen for the doings of a firm of solicitors and another of surveyors. With the ill-luck that has pursued him through life, it fell to the lot of the bran new Sir Thomas Ackland—a middle-aged member of Parliament—to defend the dealings of the Ecclesiastical Commissioners with the Finsbury estate. The charge was, that when they came into possession of the estate, on the expiration of a long lease, they thought nothing of the question of health, and everything of the question of money. A report of the medical officer for the parish of St. Leonard's, Shoreditch, set forth—

First, that sufficient care and diligence had not been used in closing and removing houses unfit for human habitation; and, secondly, that model lodging-houses, warehouses, and other buildings of great height had been erected upon old foundations—that is, upon the narrow and tortuous lines of what had originally been little streets of cottages. The Commissioners, it was alleged,

had granted ground leases without insisting upon desirable covenants and conditions, or had granted them to persons who were unable to fulfil their engagements, so that the intervention of the local health authorities and the orders of a magistrate were required for the abatement of flagrant nuisances upon the estate; while the narrow streets, which had been comparatively unobjectionable when bordered by small tenements, were darkened and deprived of air by the lofty buildings erected upon the old lines. Moreover, some of these lofty buildings, intended to be used as workshops, were built back to back, and absolutely without ventilation.

The failings of the commissioners are characteristic of commissions and of corporations devoted to making money. As a contemporary observes—

Upon the whole, it seems plain that the Ecclesiastical Commissioners did not enter upon possession of this great estate with any definite policy to guide them in its management, or with any just ideas of the magnitude and nature of the interests at stake, or as to the necessity of laying down sufficient rules concerning the hands into which the ground might ultimately fall. They have done nothing which was not strictly within their rights, but they have failed to show either the intelligence or the public spirit which might be fairly expected from trustees for the public.

The agents of the commissioners do not consider themselves in the least trustees for the public; their fees, their bills of costs, pass muster most easily when they produce a good balance-sheet —a handsome surplus. But it was cruel to put up Sir Thomas Ackland in the House of Commons to defend doings worthy of an impecunious speculating builder, considering that he once proposed to create a Minister of Agriculture and of Health, and suggested himself as the fittest man for the office.

The Corporation of London has been most righteously protected, by the House of Lords committee, from the onslaught of Mr. Ayrton. The Bill the First Commissioner introduced has been castrated of the clause which would have stopped the proceedings. The Corporation has commenced proceedings in Chancery against the encroachers in Epping Forest. There is still a chance that this magnificent playground may not be nibbled away by the lords of the manors and owners of villas. It is a pity that the Corporation will not go a little farther at home, and do something to turn revenues, now abominably wasted, to useful purposes. The library of the Corporation will shortly open—a very creditable affair. But the City, behind Liverpool, Manchester, and Leeds, has no free library, and yet there stares you in the face in Basinghall Street a great building with a great revenue devoted to the Gresham Lectures, which represent time and money wasted. In all the City there is not one institution opened at moderate fees to the masses, devoted to instruction in physical science, and yet the City swarms with halls sacred to the great art of cookery. It is true that the Corporation, as a Corporation, has no power over these great co-operative guzzling halls, where a halfpennyworth of charity is drowned in a gallon of sack. But there is such a thing as moral influence. We know that every alderman and every common councilman is a liveryman of one of these great feeding establishments.

We hear from time to time of some turnpike trust being extinguished. There is an impression in the House of Commons that at no distant date toll-gates will cease to obstruct our highways. There was a time when they stood in Bishopsgate Without, and worried the drivers ascending the steep hill of Pentonville; obstructed the main road at Knightsbridge, and caused miles of block at Brixton and Kennington on Derby days. You may now drive in almost any direction of London, except the north-east, without being made to stand and deliver to one of the enterprising Mr. Levy's agents. It is reported that very soon the road to Alexandra Palace, past that public-house where, according to an inscription, Queen Victoria halted thirty years ago, will be made toll free. But at present, so far as legislation is concerned, there are no signs of relief for the infinitely more important public on foot and on wheels who have to cross the insolvent toll-bridges of London. Southwark, the most useless of all, because the most out of the way, and with gradients positively dangerous for a loaded waggon, has been freed by the wisdom of the City of London. But Waterloo Bridge remains unprofitable to its shareholders, unequal to the demands of its creditors, and only advantageous to its paid officers, its solicitors, its surveyors, and its architect. It would be a waste of words to dilate on the mischief of such an obstruction in the heart of the metropolis. We do not say so much about Vauxhall Bridge, because the Embankments have provided a shorter cut from Belgravia; or about the Pimlico Suspension Bridge, whose tolls are doomed to extinction. We confine ourselves to that great obstruction to trade—Waterloo. We do not suggest confiscation. We only ask that the principles which are applied to houses, parks, churches, and churchyards, where they stand in the way of a railway, may be applied to this bridge. Let the Metropolitan Board, or some other suitable body, have powers to compel a sale at the present value, *plus* the sum always added in compulsory cases. Whether it would be right to impose a bridge-rate on the owners of property on the Surrey side, which would be so much benefited, we will not venture to suggest. With the bridge tolls removed, there is no reason why the tramways should not be extended to the edge of the Strand. The Metropolitan Free Bridge Association has taken the Waterloo Bridge tolls in hand, and deserves the support of the district and general metropolitan public.

We publish in another page the balance-sheet of the Tunbridge Wells Sewage Farms. It is not encouraging to those who are sanguine of profits from such an employment of the contents of sewers. On the Northern Farm there is a profit towards the interest of nearly £3500, which the town has to pay on the money borrowed for the execution of the works, for one year's working of £227 12s., and on the Southern Farm of £519 12s. 8d. Not that these unprofitable results prove anything against the application of sewage. They only prove that the parties who laid out these farms, and expected a profit, did not understand their business. We should require a great deal more information than we have before us to enable us to tell whether it is original faults in laying out, or faults in management, that make farms, with so good a market close at hand, so disastrously unprofitable. The scheme never looked a good one—it was the scheme of a desk engineer, not of a practical sewage farmer. One important question remains. The farms were established to slay a nuisance—a Chancery suit—in a word, ruin to the finances of the town. The grand question then is, has the nuisance been slayed? If it has, then there is one great point gained, and the farming proceedings may be improved by employing a competent manager.

The report of the engineer of the Commissioners of Sewers seems to have been revised or edited by one of the committee, for it does not give any real information in one of its most interesting chapters—viz., "Scavenging and Dusting." The improvements described, although important in detail, are not imposing. The greatest is, perhaps, the widening of the Poultry, which, since the publication of the report, has been pushed through the deserted church of St. Mildred. The patience of street improvers is sadly tried by the obstructiveness of officials, clerical and lay, representing churchless congregations. The jobs of the times of Charles II. survive, and bear bitter fruit in the present day. A very few zealous clergymen, and a very few churches, would supply all the wants of the real inhabitants of the square mile that constitutes the City. But it is not only the incumbent with very little to do who opposes transplantation, but a powerful standing committee, the vestry clerk, the clerk, the beadle, and all the tradesmen with whom the vestry deals. Hence the violent *opposition of vested interests* to the Bishop of London's Bill for making more easy the conversion of clerical sinecures into working churches. The ratepayer in Southwark who protested against paying £600 a year for a weekly congregation of 40 souls, including paupers, had no law but a good deal of reason on his side. The improvements round St. Paul's still hang fire; the inhabitants of the shops at the north side joining with the cathedral authorities in resisting the conversion of the private into a public thoroughfare. The inhabitants of Queen Street are fortunate in being so well represented. Their noisy pavement has been replaced with asphalte, and half the thoroughfare widened. When shall we have decently wide access to the penny steamboats? Can no powerful person in the steamboat interest make himself sufficiently disagreeable to the commissioners?

On Ludgate Hill beneficially destructive works seem proceeding with unaccustomed rapidity, and the way to the Criminal Court in the Old Bailey is being widened. If some enterprising company would only take Newgate, and send the prisoners into the suburbs, one of the most disreputable straits in the City might be brought into harmony with the Holborn Viaduct improvements. The Fleet Street and Farringdon Street Circus completed, proves to be both useful and ornamental. It is good news to hear that the opposite corners are to be treated in the same way —a very simple plan for relieving a crowded cross traffic on wheels.

Asphalte pavement, in spite of the drawback of slipperiness, is a decided success in thoroughfares of great traffic, where kept perfectly clean. The engineer calls attention to the new system of wood pavement in Bartholomew Lane as likely to produce a noiseless material available where the steep gradients of streets render them totally unfit for asphalte. The reporter might have said more on the admirable manner in which the City streets are cleaned by the street-orderly system, assisted by the asphalte pavement, and occasional washings with hose and jet. But, perhaps, he was wisely silent. Former reports told how much had been saved from year to year on scavenging contracts. Nothing is said about expense now—nothing about difficulties with snow. The City is now kept clean regardless of expense, and that is the proper course.

We have never shared the ignorant impatience of those who so early began to exclaim that the London School Board talked too much and did nothing. Theirs was a new and very great undertaking—the creation of education for the most neglected class of children—a task not to be commenced without the collection of

much preliminary information, and the creation of public opinion amongst greatly differing, if not absolutely hostile parties. At the last weekly meeting of the Board, very important results were included in a return made on the motion of Lord Mahon, giving a list of schools actually at work, and of schools in course of preparation and construction. Over 23,000 children are being educated in 96 schools. Very shortly these schools will be increased to 113, and active preparations were being made for the opening of 37 more schools, which would accommodate nearly 35,000 children, who at present for the most part frequent no day schools. Public opinion is rapidly forming in favour of compulsory attendance—the moral suasion of visitors failing in the West as well as in the East end, parents must and will be made to do their duty.

The committee of the School Board on Charitable Endowments have presented a report drawn in the sense of the schemes of the Charitable Endowment Commission, but going much farther, and therefore still more opposed to the principles of the Corporation of London; for the Corporation adore the system which creates charity boys of the Uriah Heep pattern, and call everything confiscation that diminishes their personal patronage. In the case of the Emmanuel Hospital, which the Court of Aldermen claim to have managed so admirably, it appears that the leading features of the management have been increased income and stinted expenditure. The income of the Yorkshire estates having increased in 140 years from £360 a year to £4000 a year, the original 20 aged pensioners are still 20, and the 20 poor children are only 60. The Black Coat Hospital has over £2200 a year, and boards and educates in a common sort of way only 20 poor children. While the Green Coat Hospital, with an income of £1000 a year, gives a National School education to about 30 boys. The gross income of these four schools is about £8000 a year. The committee of the School Board, so far from leaning to the opposition of the friends of Uriah Heep, the Aldermen of London, consider that the course of education proposed by the Endowed Schools Commissioners is not of a sufficiently high grade. They recommend a higher form to be established for the benefit of promising pupils, to enable them to pass through higher schools to the universities, or exhibitions to be provided for maintaining them, from 18 years of age, for three years.

The entrance fee was fixed so as not to exceed 10s.; and the tuition fees were for the lower school not more than £3, nor less than £2 a year; for the higher day school and the boarding school, not more than £5, nor less than £3 a year; the tuition fees to be, as far as practicable, fixed at such a rate as would at least cover the increased expense of tuition caused by the reception of other than exhibitioners.

It is scarcely necessary to say that the representatives of the City of London opposed this report, which is to be discussed at a future meeting. The principles by which the Endowed Schools Commissioners have been guided—the extinction of the patronage charity boy, and the creation of rewards for educational merit—have been approved by the London School Board and by the Educational Department of the Privy Council—the highest authorities in existence. That the commission should not have secured more support is due chiefly to its composition. The report before us, instead of being a clear statement, like the reports of Mr. Fearon and Mr. Fraser—now Bishop of Manchester—is a dull, dry, obscure argument, without a quoteable fact or figure. Lord Lyttelton, the chairman and autocrat of the Board, is a highly educated and honest man, to whom nature has denied the power of articulate speech, or the power of plain explanation in English. His style is worse than Sir Thomas Ackland's. He may be a Don in Greek Sapphics or Latin Hexameters. He has translated Homer; but healthy, hearty, picturesque English is to his lordship an unattainable mystery. This is deeply to be regretted, because a popular man and plain writer in Lord Lyttelton's office would have put forward endowed school reform a quarter of a century. Never has a more dreadful specimen of obscure dulness been produced than Lord Lyttelton's Endowed School Report.

Our readers will remember that a Commission was appointed by the Board of Trade, under the supposed authority of the Metropolis Water Act, 1871, to make an inquiry in relation to the regulations proposed by the London water companies preparatory to giving a constant supply. At the first meeting of the Commission, Sir John Karslake, who represented the companies, objected to the Commission on the ground that the Act of last year gave no power to the Board of Trade to delegate its functions to a Commission. Whether the objection could be sustained or not is now of no consequence, for the Board of Trade have brought in a short Bill, the single clause of which runs as follows:—"That wherever in any Act of Parliament it is directed that an inquiry shall be held or instituted by the Board of Trade, the same shall be deemed to have been duly held or instituted if conducted by any person or persons duly authorized in that behalf by the president of the said Board, by writing under his hand or under the hand of one of the secretaries of the said Board."

Circular to Gas Companies.

The Meeting of the British Association of Gas Managers in the past week has been a highly successful one. An unusually large number of members attended; 71 new names were added to the list of members, and the balance-sheet produced showed the finances of the Association to be in a very flourishing state. The proceedings were all that could be desired, the papers read having for the most part much practical interest, and eliciting full discussion. In his inaugural address, the President took occasion to allude to the Sunday labour question, and the benevolent fund, subjects mooted at previous meetings, but allowed to drop out of the consideration of the Association as a body. With regard to the former, he stated that several members of the Association had succeeded in establishing a twelve hours complete rest on Sundays, even in winter. As regards the latter, he announced the offer of Mr. A. A. Croll to contribute £100 if such a fund were commenced, and mentioned that several others had expressed their intention of contributing liberally. He, therefore, urged upon the committee the desirability of taking steps to commence the fund. The president then referred to the loss the gas world had sustained since the last meeting by the deaths of Mr. Kirkham, Mr. T. Livesey, and Mr. John Grafton. After a brief review of recent gas legislation, he gave a lengthy summary of the reports of the gas referees on ammonia and sulphur purification at Beckton, and then passed to a notice of Dr. Eveleigh's improvements, and the oxyhydric light. He subsequently drew attention to Mr. Somerville's improvements in the machinery for charging retorts, and the patent of Messrs. Porter and Lane. The subject of choked ascension-pipes next received his notice, and he called the attention of the members to the invention of Mr. Box, who employs thin wrought-iron ascension-pipes, which are not so likely to choke, and if they should become choked, are easily removed and replaced. The president next called attention to Mr. Skelton's catoptric lantern, and very correctly remarked that in no department of gas lighting are improvements so much needed as in the public lamps. He next dwelt at some length on the coal question, and remarked upon the difficulties gas companies have to face in consequence of the enormous rise in the price of raw material, and the increased cost of labour. To statutory companies bound down to a maximum price this matter presents a very serious aspect, and it is probable that some of them will before long be driven to Parliament for relief. The gradual absorption of gas undertakings by local authorities was next referred to, and the president gave excellent advice to managers (which also concerns directors) when he recommended them to put their respective undertakings in such a position as to bear scrutiny, and refute the prejudicial representations which are commonly made concerning them. Next, he very properly advised gas companies to become more intimate with their customers, not merely supplying them with gas, but advising them as to the best and most economical means of consuming it; and thus, as he correctly said, most sources of complaint would at once be removed, and the use of gas largely extended. With another brief reference to the sulphur question, and to some contradictory statements respecting bisulphide of carbon, the president concluded an address which was very attentively listened to and heartily applauded.

The first paper read was by Mr. Jones, of Dover, "On the "Various Methods of Collecting Gas Accounts," in which he expressed a preference for the "five-period" system where it could be adopted. The shorter the credit gas companies give the better, and that is one recommendation of the five-period plan. Another is, that the collector does not call immediately after Christmas, when the consumer has so many other bills to pay. The book system followed by the author in Ireland would be a very good one if inspectors were infallible, which he had said before they were not.

The announcement of Mr. Mellor's paper, "On Eveleigh's Process of Gas Manufacture," naturally attracted a full attendance of members. The greater part of the paper, as will be seen by our report, was occupied with a description of the apparatus employed, which those of our readers not present at the meeting can easily follow by referring to the drawing we gave with our number for Feb. 27 of this year. The objects of the different parts of the process, and the results obtained in them, were also fully described, and then the author addressed himself to the practical question, "Will the process pay?" This is a question which none but the Patent Gas Company are, at present, in a position to discuss. What we should like to know is, whether it pays at East Barnet at the present moment. The advantages, as Mr. Mellor puts them, are as follows:—More gas of better quality, and more and better coke, with the same amount of labour, the same expense of fuel, and the wear and tear account about the same. And, suppose we say, the cost of

purification about the same, for Mr. Mellor did not answer the question on this point.

Per contra, we may say—1, a royalty to the Patent Gas Company; 2, no tar, and very little ammoniacal liquor to sell; 3, one-fourth more space required for manufacture; and 4, £25 per retort additional cost in the first instance. Now the quality of the gas not being called in question, the best answer to the query, "Will the process pay?" would be a balance-sheet, showing the result of the workings at East Barnet. In reply to this, we may be told that much capital has been expended at East Barnet in perfecting the process; but a fair allowance for this might easily be made, and the cost of the gas sold to the East Barnet Company readily got at. As regards the permanency of the gas made, Mr. Mellor's assurance leaves us no doubt, and we shall look to Dr. Odling and Mr. Keates for an explanation of the changes which take place most likely in the charcoal cylinder, and an analysis of the gas there formed. Dr. Eveleigh asserts that much olefiant gas is produced there, which does not look likely when we see that the gas from tar and oil has a lower illuminating power than the gas from coal. There is, we may say here, no novelty in applying the heat to the surface of a liquid in order to evaporate it. In all manufacturing operations in which large quantities of solutions have to be boiled down, it has for long years been found better to drive the heat over the surface of the liquid than to put a fire underneath the vessel.

It seems to be assumed by Mr. Mellor and by most speakers in the discussion that the discovery that coal distilled at low heats yielded a rich gas, and that tar and oil could be redistilled for gas, belonged to Dr. Eveleigh. In fact, it no more belongs to him than to a dozen or more other men. Dr. Eveleigh's system is the system of apparatus figured and described in his specification, and the question that ought to have been discussed at the meeting is whether that system is the best form of apparatus that can be devised. The question may perhaps occupy the attention of a good many engineers, and we need not further refer to it. We have no wish to depreciate the value of Dr. Eveleigh's invention, but we feel bound to point out to our readers a subject on which they may fairly exercise their abilities. The report of Dr. Odling's interesting lecture, and of the other communications, we must defer for the present.

The Home Office has refused the Corporation of Ryde permission to increase their borrowing powers, so the completion of the purchase of the gas undertaking remains in abeyance. The refusal places the Corporation in difficult circumstances. They have, in fact, borrowed £60,000 for the purchase, for which sum they have to pay interest, and, according to arrangement, they have to pay interest to the gas company from a specified date until the purchase-money is paid; and how the arbitration is to be set aside, unless by consent, is not clear to us. Nor are we clear as to how the application came before the Home Office. The inquiry at Ryde, on the petition of the Corporation, was, as our readers will remember, suddenly brought to an end by the announcement of Mr. Michael that the Corporation withdrew their petition, and would proceed next year by application to the Local Government Board for a Provisional Order. This, or an application for an Act of Parliament, is now all that can be done; but, in face of the fact that 11,000 out of 15,000 ratepayers are opposed to the purchase, neither one nor the other is likely to be obtained. The result for the present is that the Corporation are, vulgarly speaking, in a mess. The events at Ryde may possibly damp the ardour of some other enterprising local authorities, anxious to embark in the manufacture of gas.

We may once before briefly reply to some erroneous notions as to the duties of the metropolitan gas referees. They are to prescribe and certify the testing-places, and what apparatus is to be used therein for testing the illuminating power and purity of the gas. The place selected, and the apparatus installed, both are thenceforward under the control of the local authority, the Corporation, or the Metropolitan Board of Works, whose duty it is to see that the apparatus is kept in perfect order; for, if on appeal the chief gas examiner finds a defect, no penalty will be enforced against the gas company. It seems doubtful to us whether the company can fairly be made to pay for the apparatus; most certainly the cost of candles and chemicals are expenses incurred by the gas examiners in the execution of their duties, and should be paid by the local authority. It can never be supposed that the Act of 1868 and the subsequent Acts contemplated making the referees a permanent institution—a perennial charge on the gas companies. The appointments are altogether anomalous, and the mode of remuneration, we believe, without precedent. Some alteration in the law is obviously necessary, and we hope the Board of Trade see their way to effect it.

The report of the Paris Gas Company for 1871 furnishes us with some interesting details respecting the manufacture and distribution of gas under difficulties. At their previous meeting the directors had congratulated the shareholders on the comparatively small loss entailed upon them by the Prussian siege, little dreaming that a much more disastrous time was soon to follow. In April, 1871, the consumption of gas in Paris began to rise, and promised in a few months to regain its normal proportion. But the insurrection of the Commune followed immediately, and Paris had to sustain a second siege. During this the supply of gas was never interrupted, and it speaks volumes for the management of the company, that not one of the 3000 men in their employ joined in the insurrection. The directors pay a well-merited tribute to the devotion of their *employés* of all grades, but not a little praise should be awarded to a body of gentlemen whose liberality and consideration have inspired such devotion in a city where nearly every working man is a Socialist.

On the whole the damage done to the works and mains of the company in the course of the two sieges was not so great as might have been expected. Nine gasholders were pierced by shells, many guides were broken, and roofs and walls injured by projectiles, but the repairs of those only cost the company £2763. The mains suffered to a greater extent, especially in the environs occupied by the Prussians, in which 248 miles of pipes required to be carefully examined and made good at an expense of £9223. Pillars and lanterns, of which an immense number must have been destroyed, belong to the city, so the company takes no account of them. Along with houses, too, a good many meters were destroyed, and it has cost the company £832 to replace these. Lastly, among the losses entailed by the second siege must be reckoned the stamp duties on transfers which the Commune forced the company to pay, and which M. Thiers's Government have compelled them to pay again, making no reply to the remonstrances which the company urged. The total expenses incurred on account of the two sieges is set down at £17,360.

The loss the company sustained is shown by the quantity of gas consumed and the rental. The gas consumed in 1871 amounted to 3,089,825,915 cubic feet, which is 950,223,591 feet less than was consumed in 1870, and 2,038,429,360 feet less than the consumption in 1869, which last is referred to as a "normal" year. The rental, of course, fell off in like proportion. Last year it amounted to £812,480, or £282,736 less than in 1870, and £613,441 below the rental of 1869.

Notwithstanding the troubles, the number of consumers actually increased, and the day consumption of gas fell off but little, much success having attended the efforts of the company to induce people to use gas for other purposes than lighting. The mains have been considerably extended during the year, the total length now laid being 941 miles. The works also have been enlarged, and the manufacturing power is now estimated at 10 per cent. in excess of the probable requirements of the present year. Along with the consumption of gas the dividends have necessarily gone down. In 1869 the dividend paid on an original share (after dividing the profits above a certain amount with the city) was £4 1s. 8d. The dividend payable for 1871 on an original share (split into two in 1870) is only £2 12s. 6d., and there is no excess of profits for the city to participate in.

The revenue account shows that the total expenses of the company in 1871 amounted to £777,096. In this total the item "coal" figures for £276,825; and the heating materials, coke and tar, £63,977; superintendence and labour at works, £44,269; repairs and alterations at works, £40,102; charges accessory to distillation, £21,605; and cost of purification, £3419. Among the other items we may mention, directors allowances, £3200; and the executive committee, £2800. The salaries (not comparable with the same item in the accounts of the London companies) amount to £21,060, and the law expenses to £431.

On the other side, the sale of gas produced £812,480; coke (retort), £260,946; tar, £23,219; ammoniacal liquor, £5419; meters, £23,219; branches and fittings, £28,500. The Paris Company is engaged in other manufactures not followed in English gas-works, the receipts on which bring the income up to a total of £1,213,212. There thus appears a profit of £436,115 on the year's working. The municipality do not participate in the profits unless they exceed £496,000. The dividend paid is, as we have said, £2 12s. 6d. on an original share, which is equal to about 12 per cent. The reserve accounts of the company we need not go into.

Among the things which must have contributed to cement the good understanding between the company and their *employés*, the benefit society (*caisse de prévoyance*) calls for particular notice. This is supported by a deduction of 1 per cent. from all salaries and wages, and a contribution by the company equal to the total amount of the deductions. There is also a pension society (*caisse des retraites*); and it is worthy of notice that the funds of both these societies are invested in shares of the company, which makes it, to a limited extent, a co-operative undertaking.

Among other miscellaneous matters, the report makes a brief reference to the oxyhydric light recently tried on the Boulevards, and here at the Crystal Palace; and the directors say that

from their own experiments, and the information which reaches them from Belgium, Germany, England, and even from America, where, as our readers know, the light has been greatly puffed, they are led to believe that the use of oxygen is never likely to interfere with the interests of the company.

The report concludes with a rather melancholy review of the onerous contributions exacted from the undertaking by the state and municipality. Already taxed and rated in almost every possible way, they were threatened last year with a duty on gas. This was successfully resisted; but in the present year the municipality of Paris having no share in the profits of the company to receive, and being in straits, have applied for an advance of £300,000, in anticipation of future profits. The company have not felt themselves in a position to resist this demand, and accordingly they propose to raise the money by the issue of bonds, bearing interest at 5 per cent., to be redeemed at par in the course of 32 years. Taking the whole of the circumstances together, we may heartily congratulate the directors on the success which has attended their efforts under such unprecedented difficulties, and, fully approving their financial plans, wish them every prosperity in peaceful times which we hope will endure.

Correspondence.

PATENT GAS.

SIR,—It is somewhat ungenerous of Mr. Mellor to accuse me of improper motives in writing as I have done about the patent gas, after the repeated declarations I have made that I have no other interest in prolonging the correspondence than that of gas lighting in general.

Leaving "*animus*" out of the question, it is to my interest to adopt every real and substantial improvement in the production of gas, let it proceed from whatever source it may, and I am incessantly on the look out for such improvements.

What I desire is, to be authorized to make such practical tests at the works at East Barnet as will settle the doubt I have of the slightest beneficial result to be obtained from the Eveleigh system of making gas. Mr. Mellor's last letter, giving specific figures, does not, in my opinion, confirm the results which he states he obtains from a ton of coals. It seems very much like cutting the coat according to the cloth, not according to the body which it has to fit: 8000 cubic feet of 23-candle gas will certainly weigh more than 313 lbs., even if it be perfectly free from carbonic acid gas. And then it appears that instead of producing 14 cwts. 2 qrs. of coke, it is 13 cwts. 1 qr. 16 lbs., and 1 cwt. 0 qr. 12 lbs. of water; so that a person buying a ton of coke purchases at the same time 8 per cent. of water. This puts me in mind of my being at a meeting of the Society of Arts some years ago, when a gentleman got up and said he believed the time would come when we should have simply to bring to our fireplaces a pan of water, instead of coal, for fuel; but he could not tell us in what direction he thought this boon would come. Mr. Mellor has, to the extent of 8 per cent., got so far on the road towards this gentleman's prophecy. If I could have seen Mr. Mellor's calculations, by which he had the difficult problem to perform of reducing his products from 23 cwt. down to 2240 lbs. from a ton of coals, I fancy there would have been a good many alterations before he hit upon the precise quantity and weight of each product; for, in order to keep the weights right, he has only calculated upon 3½ gallons of ammoniacal liquor, which, to me, is very astounding, coming from a man with so much practical experience; but there is this to say, that if more had been put down, the weight of the products would have been greater than a ton. However, I agree with Mr. Mellor that this "war of words" had better cease. Through your courtesy, he has had his say, and I have had mine, and our figures speak for themselves. I desire to repeat that I have no other motive in writing as I have done than to endeavour to obtain information with regard to Dr. Eveleigh's patent. And, as yet, nothing that I have heard or seen in respect of this matter alters, in the slightest degree, the opinions I have so openly expressed in your JOURNAL. But if it be an invention which is to enable us to make better gas at less cost, let us have fewer *theoretical* experiments, and more *practical* trials, to test the £ s. d. value of the invention. The present market value of the shares is not due to actual results obtained, but to theoretical figures and statements, backed by the fortuitous circumstance of a proprietary with faith and money.

Dr. Letheby, Dr. Odling, and Mr. Keates are men before whom most of us would bow in matters connected with the chemistry of gas lighting, but they are not the men to settle the commercial part of the question; and, until the company have sufficient faith to allow themselves to ask a committee of disinterested engineers to practically test the process for commercial results, they must expect a class of unbelievers, of whom I am one.

St. Neots, June 14, 1872. GEO. BOWER.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JUNE 3, 1872.

DARLINGTON BOROUGH SEWAGE IRRIGATION Bill.—The Commons amendments were considered and agreed to.

The KINGSTON-UPON-HULL WATER, &c., Bill was read a second time, and committed.

The ALTRINCHAM GAS Bill was read a third time, with the amendments, and passed, and sent to the Commons.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill was brought from the Commons, and read a first time.

The BURY IMPROVEMENT AND WATER Bill, and the WALLASEY IMPROVEMENT Bill, were brought from the Commons, and read a first time.

The GAS AND WATER ORDERS CONFIRMATION Bill was referred to a Select Committee, consisting of the Earl of Cadogan, Earl Rosse, Lord Vaux of Harrowden, Lord Blantyre, and Lord Balinhard.

TUESDAY, JUNE 4.

The CARNARVON CONSUMERS GAS Bill was reported, with amendments.

The BOLTON CORPORATION Bill was read a second time, and referred to a Select Committee, consisting of Earl Stradbroke, chairman, the Duke of Manchester, Earl Effingham, Viscount De Vesci, and Lord Monteagle of Brandon, who will sit on Monday, June 10, at eleven o'clock.

The KEIGHLEY WATER Bill was brought from the Commons, and read a first time.

THURSDAY, JUNE 6.

The GAS AND WATER ORDERS CONFIRMATION Bill.—The opposition was withdrawn, and the Bill committed to a committee of the whole House.

The WILMSLOW AND ALDERLEY EDGE GAS Bill was returned from the Commons, agreed to.

Petitions were deposited against the BURY IMPROVEMENT AND WATER Bill, from Sudden Bridge and Bury Turnpike Road Trustees;—and against the WARWICK LOCAL BOARD WATER Bill, from the Earl of Clarendon, Lord Leigh, and others.

FRIDAY, JUNE 7.

The HAWORTH LOCAL BOARD OF HEALTH Bill was read a first time.

The LOCAL GOVERNMENT SUPPLEMENTAL (No. 2) AND ACT (No. 2, 1864) AMENDMENT Bill was read a first time.

The GAS AND WATER ORDERS CONFIRMATION Bill.—An amendment made in committee.

Petitions were deposited against the BRIDPORT WATER Bill, from the Duke of Bedford and Lord Rivers;—and against the ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT Bill, from the Local Board of Buersil, James Davenport, and the Burial Board of Heap; and Mrs. Roscow, and others.

MONDAY, JUNE 10.

The BRIDPORT WATER Bill was read a second time, and committed, as also the WARWICK LOCAL BOARD WATER Bill.

The ALTRINCHAM GAS Bill was returned from the Commons, with the amendments agreed to.

The GAS AND WATER ORDERS CONFIRMATION Bill.—Amendment reported.

LOCAL GOVERNMENT SUPPLEMENTAL Bill.—Bill reported without amendment.

TUESDAY, JUNE 11.

WARWICK LOCAL BOARD WATER Bill.—The opposition to the bill was withdrawn.

The ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT; the BURY IMPROVEMENT AND WATER; the WALLASEY IMPROVEMENT; and the HINDLEY LOCAL BOARD (No. 2) Bills, were read a second time, and committed.

THE GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill was read a second time, and committed

The LOCAL GOVERNMENT SUPPLEMENTAL Bill was read a third time, and passed.

The BRIDPORT WATER Bill was referred to a Select Committee, consisting of Earl Somers, Viscount Strathallan, Lord Saltoun, Lord Bolton, and Lord Chaworth, who will sit on Friday, June 14, at eleven o'clock.

A petition was deposited against the KEIGHLEY WATER Bill, from J. H. Craven

THURSDAY, JUNE 13.

BRIDPORT WATER Bill.—The opposition was withdrawn.

The BRIGHTON CORPORATION WATER, and the KEIGHLEY WATER Bills, were read a second time, and committed.

GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill.—An amendment was made.

FRIDAY, JUNE 14

The LYMM LOCAL BOARD GAS Bill, and the BOLTON CORPORATION Bill, were reported, with amendments.

The GAS AND WATER ORDERS CONFIRMATION Bill was read a third time, with the amendments; further amendments made, Bill passed, and sent to the Commons.

The ROCHDALE BOROUGH EXTENSION Bill, and the BURY IMPROVEMENT AND WATER Bill, were referred to a Select Committee, consisting of the Duke of Bedford (chairman), Lord Vernon, Lord Lilford, Lord Clonbrock, and Lord Brougham and Vaux, who will sit on Tuesday, June 18, at 11 o'clock.

The KEIGHLEY WATER Bill was referred to a Select Committee, consisting of Lord Camoys (chairman), Earl Fortescue, Viscount Hereford, Viscount Gough, and Lord Oranmore and Browne.

HOUSE OF COMMONS.

MONDAY, JUNE 3, 1872.

The KEIGHLEY WATER Bill was read a third time, an amendment made, and the Bill passed.

The BARROW-IN-FURNESS CORPORATION Bill, as amended, was considered.

The HAWORTH LOCAL BOARD OF HEALTH Bill, as amended, was considered, and amendments made.

The BIRSTAL LOCAL BOARD Bill was read a second time, and committed.

TUESDAY, JUNE 4.

The WILMSLOW AND ALDERLEY EDGE GAS Bill was read a third time, and passed.

THURSDAY, JUNE 6.

The HAWORTH LOCAL BOARD OF HEALTH Bill was read the third time, and passed.

The BIRMINGHAM SEWERAGE Bill was recommitted to the former committee.

FRIDAY, JUNE 7.

The TAMWORTH GAS Bill was reported, without amendment.

ALTRINCHAM GAS Bill.—The Lords amendments agreed to.

The BARROW-IN-FURNESS CORPORATION Bill was read a third time, and passed.

The BIRMINGHAM SEWERAGE (recommitted) Bill was reported, with further amendments.

MONDAY, JUNE 10.

The DARLINGTON IMPROVEMENT Bill, and the TONBRIDGE GAS Bill, were read a second time, and committed.

TUESDAY, JUNE 11.

The NEWTOWN WATER Bill was reported, with amendments.

WEDNESDAY, JUNE 12.

The BIRMINGHAM SEWERAGE (recommitted) Bill, as amended, was considered.

FRIDAY, JUNE 14.

The BIRSTAL LOCAL BOARD Bill was reported, with amendments.

The TAMWORTH GAS Bill was read a third time, and passed, with amendments

Miscellaneous News.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of the Shareholders of this Company was held at the Offices, 60, Gracechurch Street, London, on Wednesday, June 5—W. NICOL, Esq., in the chair.

The SECRETARY (Mr. Rowsell) having read the notice convening the meeting, the following report, with statement of accounts annexed, was presented.

General Balance-Sheet, March 31, 1872.

Dr.				*Cr.*		
To Capital—				By Preliminary expenses (balance)		£971 4 7
£5 per share on 15,000 ordinary shares	£75,000 0 0			Outlay at the stations		125,867 8 3
Less discount on shares authorized, 1868	3,000 0 0			Sundry accounts (balance)		572 16 4
	£72,000 0 0			Suspense accounts		261 14 6
£5 per share on 6000 preference shares	30,000 0 0			Commission on debentures (balance to be absorbed by profit and loss)		185 12 6
		£102,000 0 0		Furniture, London office		94 15 1
Loans on debentures—				Goods in transit		1,318 14 9
Ordinary loans	£29,670 0 0			Sundry debtors		5,927 19 11
Loans with privilege, authorized 1871	10,000 0 0			Bills receivable		965 11 10
		39,670 0 0		Stocks		12,388 3 10
Bills payable		1,749 19 0		Cash		2,679 9 7
Sundry creditors		1,461 3 6				
Reserve-fund		964 0 6				
General revenue account		5,388 8 2				
		£151,233 11 2				£151,233 11 2

Profit and Loss, for the Year ending March 31, 1872.

Dr.				*Cr.*		
To Coal	£6,448 11 10			By Gas	£19,138 19 7	
Gas-making (salaries and wages)	2,158 3 8			Coke	2,714 1 9	
Charges on street lights	1,118 13 11			Tar	54 9 6	
Wear and tear	761 2 1			Meters	138 7 1	
Lime and purifying	145 9 6			Rental of meters	390 12 5	
Rents	74 7 1			Stock	20 9 2	
Stoves	31 3 2					£22,456 19 0
General expenses	1,091 19 6			Profit on fittings	£124 14 7	
		£11,829 10 9		Rental of fittings	60 13 2	
Bad debts and allowances	£46 0 7					185 7 9
Deficiency in stocks	46 6 8			Insurance		18 7 11
Damaged goods	6 19 2			Transfer fees		9 5 0
Income-tax paid in Sicily	90 6 5					
Audit fees, Malta (three years)	63 0 0					
		252 12 10				
Preliminary expenses and sundry accounts, instalments of		386 0 2				
London expenses		1,043 15 9				
Exchange	£261 14 11					
Interest on debentures	2,513 2 8					
Interest and discount	20 1 10					
Income-tax	98 2 4					
		2,893 1 9				
Revenue		6,264 18 5				
		£22,669 19 8				£22,669 19 8

General Revenue Account.

Dr.		*Cr.*	
To Dividend account—		By Balance from last account (after payment of dividends)	£473 9 9
Payment on account on preference shares, in December, 1871	£1,050 0 0	Profit and loss	6,264 18 5
Reserve-fund	300 0 0		
Balance (for dividend)	5,388 8 2		
	£6,738 8 2		£6,738 8 2

The directors have to submit their report and the balance-sheet of the company, for the twelve months ending the 31st of March last.

It will be observed that, after placing £300 to the reserve-fund, providing for interest on debentures, and a dividend of 7 per cent. on the preference shares, a balance remains at profit and loss account, sufficient to allow a dividend of 5 per cent. on the ordinary shares, free of income-tax, and to carry forward a balance of £588 8s. 2d. to the next account. The directors recommend a dividend accordingly.

The year has not been a favourable one for gas lighting at Malta. Trade in that island has been dull, and charcoal being plentiful and cheap, the ordinary prices for coke have not been obtained. The market for coke in Corfu also has not been so good as usual. There is a slight improvement in the consumption of gas in Trapani and Marsala, and a bill for the taxation of petroleum has just passed the Sicilian Legislature, which, if not counterbalanced by other measures, must materially stimulate gas lighting at the Sicilian stations.

Since the last meeting, W. Gerard Lyaley, Esq., has retired from the direction, and Samuel Andrews, Esq., has been elected in his stead.

The directors retiring by rotation are William Nicol, Esq., and Lord Alfred Hervey, who are eligible for re-election.

The auditors, Henry M'Lauchlan Backler, Esq., and James Le Geyt Daniell, Esq., also retire, and are likewise eligible for re-election.

The CHAIRMAN, in moving the adoption of the report, said he had to congratulate the shareholders that at all the stations of the company, but particularly at Malta, there had been an improvement during the past year. As, however, it was stated in the report, the receipts for products had fallen off. The demand for coke had not been so good as formerly, and the price had suffered some depreciation in consequence. The sale of tar also, a much smaller matter, had been very slack, and the diminished return from these two items, of course, had an important influence on the accounts. During the past year the sale of coke yielded £2714; in the previous year it amounted to £2996: so that there was a diminution approaching to £300 in the results for 1872. The consumption of gas during last year was better, the rental from all the stations being £19,138, as against £18,560 in the previous year, so that upon the whole there was an improvement in the position of the company. The directors might even have recommended the payment of a half per cent. better dividend on the present occasion, but having regard to the rapidly increasing price of coal in this country, which must necessarily affect the working of the company during the present year, they felt it was not advisable to go beyond the rate declared at the last meeting. It was right he should inform the shareholders that an accident had happened at Trapani, which involved the company in an expenditure of between £500 and £600. This accident was of a very unexpected kind. The company were erecting a gasholder at the station there, and it appeared that through a want of attention to the instructions of the company's engineer, the foundations became defective. The concrete used for the purpose was not allowed sufficient time to dry, the consequence being that the foundations gave way and a loss of gas resulted. The evil had been now fully remedied at the cost he had mentioned, and the holder was in satisfactory operation. The use of petroleum had very much interfered with the sale of gas at some of the company's stations, especially in Sicily, but, fortunately, the Legislature had imposed a duty upon petroleum, which, it was hoped, would stimulate the demand for gas, and enable it successfully to maintain the competition between the two articles of illumination.

Mr. ANDREWS seconded the motion for the adoption of the report.

Mr. STOKES asked for particulars as to the increased sale of gas at each of the company's stations.

The SECRETARY said he thought it would not be prudent to go into these details in public, but every information on the subject would be supplied to the honourable proprietor if he would inquire for it in the office.

Mr. H. P. STEPHENSON thought the directors might be fairly congratulated on being able to maintain the dividend at 5 per cent. under all the circumstances in which the company had been placed. He was perfectly willing to make this statement while retaining the opinion he had always held as to the miserable policy of taking up the lighting of the two Sicilian towns, Trapani and Marsala. He thought also the company might farly be congratulated on the accession of Mr. Samuel Andrews to the board, and he believed the large experience of that gentleman in gas matters would be of considerable advantage to the undertaking. There was one point upon which he felt some anxiety, and to which he wished to draw the attention of the directors—viz., the increase of the debenture liability of the company. During the last year the debentures had increased to the extent of £3800. The total amount of debentures compared with the share capital was very large, and to go on indefinitely increasing the liability in this direction was to his mind a most improper policy, and one which might ultimately involve them in disaster. It should be remembered that the company were driven into debt entirely by taking up the lighting of Trapani and Marsala, and the carrying out of works there which had proved most unprofitable to them. That enterprise not only drove them into borrowing money, but into the creation of preference capital. It behoved the directors, therefore, to look most carefully into the matter and to endeavour to reduce the debentures as much as possible, or it might so so happen that in a future financial crisis the debentures would become due, and the company, like some railway companies which could be mentioned, would be orliged to go into bankruptcy to escape their creditors. The question he wished to ask, and upon which he should found a suggestion to the board, had reference to the accounts. What was the per centage of profit at each of the stations? He wished the shareholders to understand that there was, as he believed, a large profit made at the Malta station, which was diluted down by the very small profit, or it might be the loss at other stations. And he was about, moreover, to suggest to the board that as there was not the slightest doubt that the profits of the company would, during the next year (from no fault of the directors, but from the state of the coal market), be considerably diminished, whether the present might not be a very favourable time to endeavour to dispose of the two stations to which he had referred, and thus reduce the debenture debt to the extent of the amount received from their sale. He thought it quite possible that the local authorities of Trapani and Marsala might work those stations to a greater profit than it was possible for the company to do at a distance, and might be therefore disposed to take them in hand, and he was sure the effect would be to place this company in a much sounder financial position.

The CHAIRMAN said he was always ready and willing to give attention to suggestions made by shareholders, and especially by one so well informed on gas matters as the last speaker, but there were objections to answer publicly the question just put. He thought he was safe in saying that although the stations at Trapani and Marsala had not been so profitable as was anticipated, they had neither of them proved a loss to the company. There had always been a profit on the business done, although, perhaps, small in proportion to the outlay of capital. He demurred, however, to make a further declaration as to what the amount of profit at each station was.

Mr. STEPHENSON said he would not press for the information if he had an assurance from the board that they would take into consideration the policy of disposing of the works in the two Sicilian towns.

The CHAIRMAN said the directors would be willing to dispose of them if they could secure a purchaser without damage or loss to the company.

Mr. STEPHENSON said he was sure the company would never realize the amount expended on those stations.

A SHAREHOLDER asked where the loss sustained by the accident to the gasholder appeared in the accounts.

The CHAIRMAN said the cost had been charged against the reserve-fund. The directors had added £300 to that fund, but had been obliged to abstract it again.

A SHAREHOLDER asked whether, if coal continued at a high price, there was any prospect of being able to raise the charge for gas and coke.

The CHAIRMAN said the directors would raise the price of gas if they could, but it was difficult to accomplish it, as the consumers seemed to think they were already paying enough. With regard to coke, there was regular demand for it, and the supply in the open market was quite equal.

Mr. STEPHENSON asked whether there was any restriction in the concessions against an increase in the price of gas.

The CHAIRMAN said the company were bound to a certain charge in reference to the supply of the public lamps, but there was no limitation of price to private consumers. In reply to further inquiries, he stated that the price obtained in Sicily and at Corfu was higher than at Malta. At the latter place coke was imported, and came into competition with the supply from the gas-works. Charcoal also was imported, and was much used for cooking purposes, but the inhabitants preferred coke if they could get it. Whether the company could obtain a better price for coke than at present depended very much upon the price of charcoal. The price of coke had been of necessity lowered a little, and the company had now no stock.

The motion was put, and carried unanimously.

On the motion of the CHAIRMAN, dividends in accordance with the recommendations in the report were then declared.

The retiring directors and auditors were re-elected, and a resolution was adopted fixing the remuneration of the latter at 20 guineas each.

On the motion of Mr. STEPHENSON, seconded by Mr. MORRISON, a vote of thanks was given to the chairman and directors for their continued attention to the affairs of the company.

Mr. MORRISON, referring to the high price of coal, asked whether the attention of the board had been given to any of the recent improvements in the manufacture of gas, by which it was stated a large increase in quantity could be obtained over methods hitherto in use from the same quantity of the raw material.

The CHAIRMAN stated that he had witnessed some experiments which seemed to be very successful, but he doubted whether the process was applicable to the works of this company.

Mr. ANDREWS thought that directors of gas companies ought to be very careful, and not fritter away money in trying experiments for the benefit of inventors. Whenever the board of this company found that new methods of manufacture had proved practically, by the working of other companies who had better means of testing them, to be improvements, he was sure they would be ready and glad to adopt them.

The CHAIRMAN having acknowledged the vote of thanks to the board,

Mr. MORRISON moved, and Mr. STOKES seconded, a vote of thanks to the secretary, which was put, and carried unanimously.

The SECRETARY acknowledged the vote, and the proceedings terminated.

BRITISH ASSOCIATION OF GAS MANAGERS.

The Ninth Annual General Meeting of the Members of this Association was held on Tuesday, Wednesday, and Thursday, the 11th, 12th, and 13th of June, in the Rooms of the Society of Arts, John Street, Adelphi, London.

TUESDAY, JUNE 11.

The President, JABEZ CHURCH, Esq., M.I.C.E., took the chair at eleven o'clock this morning.

The HONORARY SECRETARY (Mr. W. H. Bennett) read the minutes of the eighth annual meeting held last year in Dublin, which were approved.

The following list of applications for ordinary membership, which had been submitted to the committee, was then presented:—

ORDINARY MEMBERS.

Barclay, David	Tottenham.
Berry, George	Ashford.
Brett, R. W.	Hertford.
Broadberry, William Henry	Southend.
Brothers, F. W.	Calcutta.
Bryan, Eli	Sandback.
Clarke, David	Glossop.
Clarke, Richard	Truro.
Cranmer, J. S.	Malton, Yorkshire.
Crossley, Thomas C.	Guernsey.
Currie, Joseph Allan	Waltham Abbey.
Cutler, George	Whitehaven.
Daniel, Thomas Henry	Congleton.
Dixon, Charles	Horncastle.
Dougall, Archibald	Elgin.
Edson, George	Otley, near Leeds.
Eunson, John	Northampton.
Farrand, F. F.	Caterham Valley.
Gill, Joshua	Dawley, Shropshire.
Goddard, D. Ford	Ipswich.
Goldsmith, George	Leicester.
Good, Robert	Carshalton.
Green, Benjamin	Mitcham.
Grimwood, C. W.	Sudbury.
Hancock, P.	Middlewich.
Hardie, William	Newcastle.
Hegarty, John	Colombo.
Hersey, Thomas	London.
Hislop, G. R.	Paisley.
Jones, C. W.	Genoa.
Jones, William J.	Malta.
Jones, W. R.	Glasgow.
King, R.	Wolverton.
Laing, Robert	London.
Lord, Edmund	Whitworth, Rochdale.
Macfarlane, J. R.	Manchester.
Markham, Thomas T.	Hull.
Medhurst, William	Folk.
Moor, W.	Hetton, Durham.
Mortis, William John	Eltham.
Mosman, Thomas	West Hartlepool.
Muriel, George	Smyrna.
Niven, George Henry	Skelmanthorpe.
Ogden, Samuel R.	New Wortley, Leeds.
Ozanne, Ernest	Guernsey.
Parsons, Matthew J.	Carnarvon.
Parsons, William	Atherstone.
Philps, Walter	Dorking.
Price, Jas.	Sutton, near Chester.
Sheppard, Robert	Horsham.
Stormouth, T.	Letterkenny.
Swallow, D.	Bradford.
Tallentine, T.	Lisburn.
Tidman, Edward	North Ormsby.
Travers, Thomas	Cork.
Valon, William A.	Ramsgate.
Watson, James	Lower Sydenham.
Watson, Robert	Morpeth.
Watson, William Clarke	Kingston-on-Thames.
Wells, Henry J.	Tredegar.
White, William	Aberaychan.
White, W.	Woolwich.
Woodward, J.	Spalding.

It was unanimously resolved—"That the gentlemen whose names have now been read be elected ordinary members of the association."

The HONORARY SECRETARY read the names of the following gentlemen who had applied to be admitted extra-ordinary members of the association:—

EXTRA-ORDINARY MEMBERS.

Aird, Joseph	Great Bridge.
Andrews, W. W.	London.
Braddock, Joseph	Oldham.
M'Dougall, jun., Alexander	Manchester.
M'Dougall, James Thomas	London.
Manwaring, Joseph	London.
Peebles, D. Bruce	Edinburgh.
Willey, Henry Frederick	Exeter.

These gentlemen were unanimously elected extra-ordinary members.

Messrs. Eldridge and Plumbe were appointed scrutineers of the votes for the election of committee and officers for the ensuing year.

The PRESIDENT delivered the following

INAUGURAL ADDRESS.

Having done me the honour to elect me president of the British Association of Gas Managers, I now, with much pleasure, enter upon the duty which precedent has attached to that position—that of addressing you from the chair; and in doing this permit me, first, to assure you that I highly esteem the honour you have conferred upon me, although at the same time I feel some little diffidence in addressing you upon the present occasion. This arises in part from the knowledge that I stand in the presence of so many fellow-members, brethren in the profession, who are my seniors; but I am reassured when I reflect that we are assembled here with the common object of imparting and receiving instructive information upon those subjects which are to us, individually and collectively, of the highest interest and of the first importance. Moreover, I am convinced that I express the sentiments of all present when I say that but one feeling pervades us, and that is a sincere desire, without bias or reserve, mutually to assist and inform each other, by an interchange of our varied experiences in the scientific and mechanical details connected with the manufacture and distribution of gas. Firm in this conviction, I am emboldened in my attempt to place before you my views and experiences, although they may possibly prove in some respects comparatively crude and contracted when compared with those of many riper and more matured minds now amongst us. Nevertheless, such as they are, I venture to bring them under your notice, trusting your consideration will cover my deficiencies, and will render my observations acceptable.

Any feeling of anxiety or responsibility I may naturally experience in assuming the general duties of the presidential chair is relieved by the knowledge that I may rely upon the hearty co-operation of every member of this association in carrying out those duties. In a word, gentlemen, to you I look for support and assistance in order that we may conduct this conference to a successful issue. I am satisfied that I shall not ask in vain, nor will you deny me another boon—that of your indulgence for any shortcomings I may manifest in the conduct of our proceedings.

It is a source of great satisfaction to me to be able to state that the British Association of Gas Managers has proved to be a thoroughly successful undertaking. I am happy to inform you that its present position is almost all that could be desired, and cannot but be highly gratifying to those gentlemen who, but nine years since, united with a view of establishing it. Although we have only been established so short a time, our members number very nearly 400, and we have to our credit a cash balance of more than £300. The progress of our society has proved as useful as it has been rapid, and we may now consider it as a permanent institution. Looking to the future, I see every reason to hope for a continuance, and even an increase, of its prosperity. By the addition of every new member, the sphere of its usefulness becomes widened and its practical value increased, and as we are constantly receiving accessions to our members, so are we the more firmly consolidating our position, and commanding recognition, not only throughout the kingdom, but in every part of the world where the subject of gas lighting is entertained.

During our present session some very valuable papers will be read, some of which have been contributed by gentlemen who are well known for their skill and ability in those departments of gas engineering to which they direct their special attention. No doubt much valuable information will arise from the reading of these papers, and much practical knowledge will be gained from the discussions which will follow thereon.

It is of the greatest importance to the success of this association that every member should contribute, as far as he is able, information in this form.

Unquestionably our success and status as an associated body are closely identified with, and largely due to, the reading of sound practical papers.

The aim in preparing papers should not necessarily be length, for it frequently happens that short papers are much better than long ones. It behoves every member to exercise both care and judgment in the preparation of a paper, but the more concise it can be practically made the better.

With a view of stimulating members to produce meritorious papers, I think we should do well to offer premiums to those who benefit the association by such productions. Our funds are sufficient for the purpose, and I therefore suggest the propriety of offering premiums for papers to be read at future conferences. This practice has been most successfully adopted by societies of a kindred character and cannot fail to be beneficial to us.

I am happy to inform you that considerable attention has been paid by members of this association to the reduction of Sunday labour, and that the result, in many cases, has been of the greatest possible benefit to workmen. In all the London gas-works the hours of labour have been greatly reduced. Mr. George Livesey, Mr. Robert Morton, and others, have stopped their works entirely for twelve hours on Sundays during the past winter. This practice has not been confined to London, but has extended in a great many instances to works in the country, where a cessation of labour during a like number of hours has taken place. I need not urge upon you the importance of extending this good work, feeling assured that every member will forward and promote this great desideratum to the fullest extent that the particular circumstances of the works in which he is engaged will admit.

Passing from the interests of the workman to those of the manager, I cannot allow this opportunity to escape without reintroducing the subject of raising a benevolent fund for the relief of incapacitated deserving managers, or those who, dying, may leave behind them a family needing assistance. This subject was forcibly brought before you by our past president, Mr. Barlow, in 1868, at which time he kindly stated that if such a fund were established, he would substantially contribute towards it. Last year the question was again brought under your notice, but unfortunately no further progress was made. I therefore feel some diffidence in again drawing attention to this subject, but to my mind it is of great importance, and is well worthy of your immediate practical consideration. I am also much encouraged in bringing this before you as a gentleman who takes great interest in the success of our association has offered to contribute the munificent sum of £100 towards the establishment of such a

fund. It is my friend Mr. A. A. Croll to whom I refer; and from conversation I have had with other members I feel assured that a sum of money could be at once raised for the purpose, which would form a substantial nucleus to be increased from time to time. We should thus possess a fund which would prove of essential value in assisting those of our members who may have the misfortune, either from accident or incapacity, to require such aid. It is for you, therefore, either to refuse the offers thus made both by Mr. Barlow and Mr. Croll, or to determine that such a fund shall be forthwith raised, and to request the committee to take such steps as may be necessary for its establishment, and frame such rules as may be requisite for its management and application.

It is my painful duty to inform you that since we last met several of our friends and fellow-workers have passed away. Amongst them are three leading men in the profession, whose names can only be mentioned with a regret equal to the respect in which their memories are held. In August last we lost Mr. John Kirkham (father to our vice-president, Mr. T. N. Kirkham, and late engineer to the Imperial Gas Company), who might fairly be classed as one of the pioneers of gas lighting. He was a man of considerable engineering ability, and has left some noble monuments of constructive skill at the works over which for many years he was the chief. He was not only esteemed for his professional knowledge but for kindliness of heart and gentlemanly bearing to all with whom he was associated. He died at the age of 79, and was deservedly esteemed and respected by every member of the profession who had the good fortune to know him.

The next deceased friend of whom I have to speak was perhaps better known to you. This was Mr. Thomas Livesey, late secretary to the South Metropolitan Gas Company, and father to our esteemed vice-president, Mr. G. T. Livesey. He was elected president of this association in June, 1870. It will be within your recollection that through the delicate state of his health, he was incapacitated from taking even a short sea voyage, and we, therefore, had to forego the valuable services that he would have rendered us, had he been enabled to preside at our Dublin conference. He was a man of an eminently practical nature, of great perseverance, and of the most rigid integrity; in fact, he may be classed with the George Stephenson type of men. He was the architect of his own fortune, and in every particular a most successful man. He died very suddenly in October last, being in his 65th year. At the age of 15 he entered the service of the Chartered Gas Company as a clerk, remaining there for 18 years, after which, in the year 1839, he was appointed chief clerk to the South Metropolitan Company, eventually becoming secretary on the incorporation of the company in the year 1842. At that time the capital of the company was £88,000, and the gasholder capacity was 144,000 cubic feet, and the price charged for gas was 10s. per 1000. The company was then in an almost ruinous condition, but by his steady perseverance, quick and clear perceptive power, and businesslike habits, Mr. Livesey raised the undertaking to a state of the highest prosperity. At the time of his death the capital was £300,000, with a reserve-fund amounting to £46,000, the gasholder storeage was 2,400,000 cubic feet, and the selling price of gas was 3s. 2d. per 1000 feet. This complete metamorphosis was made during the 32 years that our departed friend was in the service of the South Metropolitan Company, which is without doubt at the present moment the most prosperous gas company in the United Kingdom. In his private life he was most kind, and nothing that could be said in his favour would be beyond what his sterling character and honesty of purpose justly merit.

In February last we lost Mr. John Grafton, who formerly held a high position in gas engineering, but of late years has lived apart from professional pursuits. In 1814 he was one of Mr. Samuel Clegg's pupils, and he continued with him for some time. To him we are indebted for the introduction of brick ovens and clay retorts, as well as for the introduction of the exhauster. Mr. Grafton erected a large number of works in this country, and at one time was the sole proprietor of the Cambridge Gas-Works. He was also concerned as director and shareholder in a number of other companies.

The legislative proceedings affecting gas companies have, during the past year been of a troublesome character, and were instituted in a manner most prejudicial to the interests of such companies.

The first was "The Gas-Works Clauses Act, 1847, Amendment Bill (No. 2)." This bill, which was introduced by the Board of Trade, created great surprise in the gas world, as no notification of any intention had been previously given of amending the original Act of 1847. As this Act had worked satisfactorily, both to the consumers and gas companies, it did not appear that any further legislation was necessary. The bill, as first introduced, was highly objectionable, and most detrimental to the value of gas property. It was fortunately opposed on the second reading, and a number of gas companies, both incorporated and unincorporated, lost no time in petitioning against it, and mainly through the instrumentality of the Gas and Water Companies Association, the result arrived at was the amendment of some, and the withdrawal of other, objectionable clauses. The bill has now passed into law, but without doing us material damage, although there are still some clauses retained which are not of a desirable character. On the whole, however, there is cause for congratulation that the companies succeeded so well in their opposition to so unjust a bill.

Another bill has also been introduced into the House of Commons by Messrs. Leeman, Mundella, Goldney, Candlish, and Dodds, entitled, "The Municipal Corporations (Borough Funds) Bill." Its object is to authorize the application of funds of municipal corporations, and other governing bodies, in certain cases, such as in opposing gas and water companies bills in Parliament. It is a bill fraught with much danger to gas companies, and no doubt its introduction arose out of the case of *Roberts v. The Corporation of Sheffield*, in which the Court of Queen's Bench ruled that corporations have no power to expend money out of their rates in prosecuting gas and water companies bills. It was then referred to a select committee, consisting of 21 members. A large number of petitions were presented by gas companies against this bill, and Mr. Baxter was retained by the Gas and Water Companies Association, and appeared before the select committee on their behalf to oppose it. It was consequently amended, and is now very much altered, though not to the extent that the companies could have wished; nevertheless, the alterations are all in favour of the companies, and in its present shape it is unquestionably of a much less objectionable character than when first introduced. What further amendments it may be subject to will depend upon the decision of the House of Lords.

"The Gas and Water Facilities Bill" of last session has been brought into operation by several companies, and appears to be of much value when the application of a company is unopposed. The expenses of statutory power under its operation are less costly than in the case of a private bill.

The metropolitan gas referees, appointed by the Board of Trade, have during the past year issued three reports—the first on the ammonia impurity in gas, the second on the construction of gas-burners with regard to the principles of gas illumination, and the third on sulphur purification at the Beckton Gas-Works. In the report on burners a great deal of useful information is given, but no new facts are set forth therein that can claim our attention. All the experiments made and their results, in using good and bad burners, have been long known to the members of our profession who are conversant with the subject of gas-burners and the necessity of having a properly adjusted supply of atmospheric air. The referees, however, having promised a further report on the subject, we may hope to receive not only some practical suggestions on the defective constructions of the burners now in use, but also remedies which will overcome their admitted defects.

The report on ammonia impurities contains some practical facts and suggestions, and will prove valuable to the profession. When the referees were first appointed they fixed 5 grains of ammonia per 100 feet of gas as a maximum, and from the experiments they have made, and also from the actual working of some of the metropolitan companies, they find it practical to manufacture gas quite free from ammonia. They consequently gave notice to the companies that on and after the 1st of November of last year, the maximum quantity of ammonia allowed in the gas was to be reduced from 5 grains to 2½ grains, and they now further hint that the standard will be reduced to *nil* ere long. They state that the process of purifying gas from ammonia consists mainly in bringing the gas into contact with water, which has a remarkable affinity for it, and is capable of absorbing above 700 times its own volume, and the most perfect process of ammonia purification is that which does its work with the least amount of water. The reasons given are—first, because when much water is used it absorbs a portion of the hydrocarbons; second, because the ammonia so formed is too weak to be saleable; and, third, that in consequence of this, the liquor has to be returned and passed through the scrubber several times to bring it up to the required strength, whereby the impurities with which the water is charged are again brought in contact and absorbed by the gas. The referees after setting forth the absolute necessity of proper and efficient condensing power, make special mention of the scrubbers employed at Blackfriars, as being the nearest to perfection in their operation. In Table 3 of their report they show the amount of ammoniacal liquor obtained per ton of coal in the different gas-works, and as at the Blackfriars works the whole of the ammonia is taken out of the gas, and also is eliminated almost entirely by the scrubbers in the form of ammoniacal liquor, the actual amount of ammonia may be calculated. At these works, 20 gallons of ammoniacal liquor of 10 oz. strength are obtained from each ton of coal, showing that the gas from each ton of coal contains about 1-10th of 1 per cent. of ammonia gas ($N H_3$). In other words, there is 1 foot of $N H_3$ in every 1000 feet of gas.

A considerable proportion of the ammonia is eliminated from the gas in the condensing pipes before reaching the scrubbers, and the more efficient the condensing process the more easily is the work of ammonia purification carried on in the scrubbers. At the Blackfriars works the condensers yield per ton of coal about nine gallons of 6 oz. liquor, and the scrubbers yield eleven gallons of 14 oz. strength, so that in this case one-third of the ammonia is taken out by the condensers and two-thirds by the scrubbers. But the ammoniacal liquor obtained from the condensers is too weak to be saleable, hence it has to be mixed with the stronger liquor obtained from the scrubbers. The requisite commercial strength of the liquor is about 10 oz.; if the liquor is much below that strength it is objectionable from its bulk, whilst if it is much above that strength it is objectionable as a saleable commodity, owing to its tendency to lose a portion of its ammonia by volatilization.

The "liquor" obtained from the condensers varies in strength from about 4½ to 7 oz.—these variations being mainly due to the condition of the coal as delivered to the retorts; for the drier the coal the less aqueous vapour is contained in the gas. Accordingly, the ammoniacal liquor formed in the condensers is less diluted than when the coal is more or less damp.

The ammonia which remains in the gas after passing through the scrubbers at the Blackfriars works only amounts to 2 or 3 grains per 1000 feet of gas. This residue is entirely absorbed by the moisture contained in the oxide of iron purifiers employed for the elimination of sulphur. At the same time it is to be observed that, in proportion as the amount of ammonia in the gas is reduced, the difficulty of catching it in the scrubbers becomes immensely increased. For example, in the excellent scrubbers employed at the Blackfriars works, where the coke is divided into three tiers or compartments, each 8 feet in depth, it is found that the lowest tier, which the gas first enters, yields of itself 11½ oz. liquor, the middle tier 2 oz. liquor, and the uppermost tier only ¼ oz. liquor. In other words, of the total amount of ammonia eliminated by this scrubber (which yields 14 oz. liquor), the uppermost tier takes out only 3½ per cent., while the lowermost takes out 82 per cent. Arguing from such facts, it is a common opinion in gas-works that the more the water is impregnated with ammonia the more capable is it of absorbing ammonia—a notion, it is hardly necessary to say, wholly erroneous. The explanation of the fact, which has given rise to this idea, is evidently the very simple one, that the difficulty of catching ammonia (or any other substance) is immensely increased when the ammonia is greatly diluted, or, in other words, exists only in an infinitesimal quantity, compared with the volume of gas in which it is contained; whereas, when the water or liquor comes in contact with the unpurified gas, as it does in the lower part of the scrubber, the proportion of ammonia absorbed is very large.

A report on the sulphur purification at the Beckton Gas-Works, dated January 31, 1872, has been issued, the publication of which was looked forward to with much interest, especially as the Gas Committee of the Corporation of the City of London has loudly complained of the large increase in the amount of sulphur in the gas supplied to the City since its manufacture commenced at the Beckton works. It appears from the report that the complaints made by the Gas Committee were well founded, inasmuch as the sulphur compounds in the gas supplied by the Chartered Company previously to the opening of their new works at Beckton contained, on the average, 27·1 grains in 100 cubic feet, whereas the gas from Beckton in the middle of last year contained, on the average, 43·2 grains, and even this large amount has been increased since that time.

The report is voluminous, and bears evidence that great care, attention, and industry have been bestowed in the consideration of this important subject, not only by the referees themselves, but also by the officers of the companies, who have given the referees the benefit of their skill and experience, in order to assist in solving a most difficult problem. In the report it is most clearly and distinctly stated that the inquiry relates exclusively to that portion of sulphur in gas which exists in other forms than that of sulphuretted hydrogen, as the referees have never found a trace of sulphuretted hydrogen in the gas supplied to the public, although the testing to which it has been daily subjected has been exceedingly stringent. The referees give the highest credit to the engineer-in-chief of the company, for having spared no expense with a view to ensure the completeness and efficiency of the works, and for having provided apparatus on an unusually extensive scale for sulphur purification, the magnitude and number of the purifiers relative to the make of gas being greater than in those employed in any other gas-works in the kingdom. It was, therefore, hoped that the hitherto unsurmounted difficulty with regard to sulphur purification would be at an end. Unfortunately, however, the result has not only fallen short of these expectations, but has proved a most startling and utter failure.

A complete table, *inter alia*, is given, showing the comparative superficial area of the purifiers per 1000 feet of gas made hourly at the several metropolitan works. Commencing with Beckton works, we find them to have 47·1 square feet, the Westminster, 31·18; Blackfriars, 25·3; Bow Common, 37·7; Fulham, 28·4; St. Pancras, 24·3; Haggerston, 21·1; and the South Metropolitan, 25·5. Taking the Haggerstone works as the unit of comparison 1, St Pancras is 1·15; South Metropolitan, 1·2; Blackfriars, 1·2; Fulham, 1·34; Westminster, 1·47; Bow Common, 1·78; and Beckton, 2·2. Thus the extent of purifying power, relative to the make of gas, at Beckton is more than double that of Haggerston, and nearly double that of most of the other gas-works except that at Bow Common.

The purifying materials used were lime and oxide of iron. At first there were twelve purifiers in use, four containing lime and eight oxide, each in a single layer 2 feet thick. Subsequently the plan was altered, when eight purifiers were used with lime (before the oxide) and four with oxide. The results were remarkable for some time: the sulphur fell to an average of 15 grains

but, unfortunately, and equally unexpectedly, the sulphur again increased in quantity, and became as great as before.

In another table furnished in the referees report, a comparison is given between the Beckton and Bow Common works, as to the purifying arrangements, which shows that the contents of the lime purifiers, relative to the make of gas, are more than twice as great at Beckton as they are at Bow, and that the contents of the oxide purifiers at Bow, relative to the make of gas, are more than twice as great as they are at Beckton.

In another table we are also shown that relatively to every 1000 cubic feet purified at Beckton, the quantity of lime in constant action is about 2½ times greater than at Bow, and moreover of this quantity of lime in constant action, the proportion of clean lime used per day is one-half greater at Beckton than it is at Bow Common relatively to the make of gas. The several results show, that of the gas made by all the metropolitan companies, that made at Beckton contains the largest amount of sulphur compounds, other than sulphuretted hydrogen, and that the gas made at Bow Common contains the least.

In the second part of the report the referees promise a further report on this most important question, and express a determination to investigate the question of impurities to the utmost extent, and to overcome existing difficulties. In referring to the failure of purifying gas from sulphur compounds, the referees suggest that it may be classed under two heads—first, probably from some defect in the distillatory process, whereby an unusual amount of sulphur, other than sulphuretted hydrogen, is produced in the gas; and, secondly, the almost total failure of the process of purification as regards this particular impurity. The referees do not consider the failure arises from the construction of the purifiers or the mode of working them, but they attribute it to the antecedent processes of gas purification by defective condensing power, besides which they state carbonic acid to form an important, and hitherto unsuspected, element of the failure.

They have previously pointed out that if gas is not properly cooled in the condensers before leaving the scrubbers, the absorbent power of the liquor in those vessels is diminished, while if tarry vapour in large quantity is carried forward into the scrubbers, the scrubbing material may be suddenly fouled, and to a degree which seriously affects the purifying action of the apparatus. In this statement—as now appears to the referees—lies the key to the secret which has hitherto escaped detection at the Beckton works. The inadequacy of the condensing power has hitherto impaired the action of the scrubbers, and this in turn has impaired, or almost neutralized, the action of the lime in the purifiers upon the sulphur.

With the requisite condensing power the function of the scrubber is to free the gas from ammonia, but in addition to this it also eliminates a considerable portion of sulphuretted hydrogen and carbonic acid contained in the gas, and hence its importance, for if any portion of the carbonic acid be not taken out by the scrubbers, it necessarily goes forward with the gas into the purifiers, and in the case of lime purifiers the entrance of carbonic acid is of all things the most detrimental to their action, as it converts the lime into carbonate of lime, which has no effect whatever upon the sulphur compounds contained in the gas. However large or numerous the purifying vessels may be, when the lime is in a state of carbonate they are perfectly useless. It is only when the lime exists as sulphide of calcium that it acts upon sulphur; therefore, in the opinion of the referees, the excess of carbonate in the lime purifiers is unquestionably the true cause of failure in this branch of the purification at Beckton. The facts set forth by the gas referees are incontrovertible, and it now remains for us to devise a method to overcome this difficulty, as it must of necessity be surmounted, however great the task may be. The referees state that they feel assured that perfect results would be obtainable from the lime process, if carbonic acid were excluded from the purifiers, and also that the results will be adequate to the requirements of the public, if the carbonic acid which enters the purifiers be kept down to the lowest point actually obtainable in gas-works.

The problem, therefore, to be solved is to devise some method of taking out all the carbonic acid from the gas during its manufacture without simultaneously taking out all the sulphuretted hydrogen, which latter compound is needed to convert the contents of the purifier into sulphide of calcium; and the essence of the difficulty consists in the fact that carbonic acid exists in the gas in very much larger proportion than sulphuretted hydrogen, whilst, at the same time, there is not a chemical substance yet discovered which will absorb carbonic acid without also absorbing sulphuretted hydrogen.

In reviewing the various inventions introduced during the past year bearing directly on gas-lighting, I will direct your attention, in the first place, to perhaps the most important—viz., Dr. Eveleigh's patented improvements in the manufacture of gas. The invention relates to the manufacture and purification of gas generated from common coal and other similar substances.

The special improvements consist in distilling from these substances, in a retort at a comparatively low temperature of about 600° to 1000° Fahr., the best and richest portions of the gas contained in such substances, together with the oleaginous, tarry, and other vaporizable matters, the residue which remains in the retort being coke of a superior quality. The rich gases, together with the vaporizable matters, are conducted from the retort by pipes in a manner somewhat similar to that followed in ordinary practice; instead, however, of the usual hydraulic main, Dr. Eveleigh uses a large evolving tank, in which the chief portions of the oily and other vaporizable matters which come over with the gas are condensed as quickly as possible. The rich gas passes on into a peculiar cooler and condenser of the following character:—A large covered tank, about half filled with water, receives the gas from the pipe leading from the first-named cooling-tank. The gas coming in contact with the extended surface of water, is still further freed from depositable substances, and when thus freed becomes lighter, rises to the top of the tank, and passes off at the opposite end by a pipe the mouth of which rises nearly to the top of the tank. This gas is then further cooled, if necessary, by being passed through pipes immersed in water. From thence it is led to the purifiers. The larger proportion of the oleaginous and other vapours which are condensed in the first cooling-tank, and the remainder which is deposited in the second cooling-tank and condenser, are then collected and conveyed into another tank, from which they are allowed to flow gradually into a heated pan, where they are revaporized, and from whence the vapours so reproduced are passed through redistillation retorts charged with chemical purifiers. In the redistillation retorts the vapours are converted into gas, which is purified therein. From the redistillation retorts the gas is passed through a cooling-tank similar to that already mentioned, and which contains water, wherein any of the vapours which have not been converted into gas by their passage through the redistillation retorts are again condensed, and may be returned to the revaporizing pan and redistillation retorts for further treatment. This process is repeated over and over again until the whole is decomposed, or until only *pitch* remains. From the cooling-tank this gas passes on to the condenser before referred to, mixing on its way with the rich gases coming over direct from the first distilling retort, and passing on with them to the purifiers, and thence to the gasholder for use.

By this process the patentee states that he is enabled to employ a low temperature in order to obtain the best and richest portions of the gas from the coal, and by his treatment of the oily, tarry, and other gas-producing vapours, he states that he fully utilizes them, and obtains the remainder of the gas which they contain. In most cases, by these means, he finds that he not only produces a larger total quantity of gas from a given quantity of coal, but the illuminating power and purity of the gas so produced are much greater than can be obtained by the ordinary process, in which a great heat is employed. The value of the residual products, such as the coke and pitch, is also said to be greatly increased.

In order to give effect to the practical working of this process, the Patent Gas Company have erected distillatory apparatus at the New Barnet Gas Company's works, and have been manufacturing all the gas required by that company for the supply of their district for some months past. They have proved conclusively that they can manufacture gas from common coal of 20-candle power; but upon the cost of manufacture and other important commercial points we are not yet informed.

Another invention, called the "Oxyhydric Light," has created some sensation, and has been publicly exhibited at the Crystal Palace during the past season. The principle is by no means new, and consists in the introduction of oxygen gas at the point of combustion with common gas. Originally, when the system of using oxygen and coal gas together was introduced, it was known as the lime light, being much admired for its brilliancy and purity. Its combustion was, however, uncertain, and the cost of manufacturing oxygen was too expensive, and it therefore fell into disuse.

The oxygen used by the proprietors of the oxyhydric light is produced by the method patented by Mr. Tessie du Motay, the invention being based upon the following data:—Manganates and permanganates of potassa, soda, and baryta; ferrates of potassa, soda, and baryta; chromates of potassa, soda, and baryta, and in general all metallic oxides or acids which will form with potassa, soda, and baryta, binary combinations capable of superoxidizing, and possess the property of yielding their oxygen at certain temperatures when they are submitted to the action of a current of steam. These bodies thus deoxidized also possess the property of becoming reoxidized when they are exposed to the action of a current of air. The invention, therefore, consists in the direct production of oxygen by means of atmospheric gas, and is based upon the double property just stated. In a retort one of the binary compounds is placed either at the minimum or at the maximum state of oxidation. If the binary compound is at the minimum state of oxidation, it is superoxidized by means of a current of air. If the compound is at the maximum state of oxidation, it is deoxidized by means of a current of steam. The oxygen and the steam on issuing from the retort pass together into a condenser, the steam is condensed, and the oxygen passes on to a gasholder in which it is collected. When all the utilizable oxygen contained in the binary compound has been disengaged by the action of the steam, the operation of superoxidation by means of air is recommenced, and *vice versâ*. The production of oxygen is continued in this alternate manner as long as is necessary.

The manufacture of oxygen by this process, possesses great scientific merit, the old method being entirely superseded, and the cost of manufacture greatly reduced. Upon this improvement the proprietors consider it can compete commercially with ordinary gas; they also claim other important advantages in its combustion and purity. By way of comparison, the value of the new and the ordinary system is given as follows:—

Oxyhydric.	s.	d.
2000 cubic feet coal gas at 3s. 9d. per 1000	7	6
Carburetting the same at 8d.	1	4
1140 cubic feet of oxygen at 8s.	9	1½
	17	11½

This, it is stated, will give an amount of light equal to 10,000 cubic feet of coal gas, costing, at 3s. 9d. per 1000, £1 17s. 6d.

The comparative cost, therefore, as stated by the inventor, to produce an equal amount of light will be in each case—

By coal gas at present supplied	£1	17	6
By oxyhydric light	0	17	11½

Thus showing a saving in favour of the new supply of over 50 per cent.

The introduction of this system would involve duplicate mains, meters, internal pipes and fittings, together with apparatus for carburetting the coal gas, all of which would entail an additional expenditure. Judging, therefore, from these circumstances, it is not likely to supersede the existing system for general purposes, although it may be used for street lighting, and also in special cases with advantage.

It was exhibited in the Paris Exhibition, 1867, after which one of the Boulevards was lighted with it, but from some cause it was discontinued, and nothing more was heard of the invention until it was tried at the Crystal Palace last November.

The subject of charging and drawing retorts by machinery has been frequently brought before you, and has resulted in some very interesting and instructive discussions. I am happy to find that Mr. Somerville, who has certainly had great practical experience in the matter, has patented some very important improvements in this class of machinery. One of the chief objections to the introduction of drawing and charging by steam power has been its inapplicability, as previously designed, to existing settings. This difficulty, I am informed, has been overcome by Mr. Somerville, the machine being so arranged as to admit of such an adjustment as to make it suitable for any form of setting. Besides this, it is said to possess the additional advantages of simplicity, and freedom from excessive wear and tear, and is so contrived as to offer great facility for repair or renewal of any of the working parts. The merits of this invention, however, you will be better able to understand upon inspecting the model which is placed upon the table before you.

Mr. Somerville has also invented a retort-lid which, while it is suited for any form of mouthpiece, admits of being luted by a machine which he has constructed for that purpose, and which may be attached to the same platform as the charging and drawing machine, and driven by the same engine.

Another matter of interest, and one which is now attracting some attention, is the invention of Messrs. Porter and Lane, by which it is proposed to supersede manual labour in charging the retorts. This is effected—to use the inventors own words—"by causing the continuous passage of a thin layer of coal through a vertical retort in close contact with the whole of the inner surface thereof, leaving the interior space free for the evolution and passage of the gas. This is accomplished by means of a screw of peculiar form suspended on a central spindle throughout the whole length of the retort, which screw is driven by steam power, and feeds itself from a hopper on the top, at the same time discharging the exhausted coke into a receptacle below, when it is removed by trucks, so that the coal is untouched by hand from first to last."

The advantages are said to be economy in space, fuel, and labour, together with an increased yield and greater freedom from sulphur. This method of carbonizing has been tried experimentally on a small scale, and the results have induced the process to be looked upon with favour by some of our best practical gas engineers. I am informed that the invention is about to be tested upon a more extended scale at the works of the Chartered Gas Company. As I have not witnessed the experiments myself, I should not feel justified in offering an opinion upon the merits of this system.

It will be remembered that at our last meeting Mr. Somerville, in the course of his paper, "On the Cause and Prevention of Choked Ascension-Pipes," stated that if "ascension-pipes were cast double, or having a jacket surrounding them with a constant circulation of water or air from top to bottom, stopped pipes would be unknown."

Now, it appears that this idea had also occurred to one of our Transatlantic brethren, who, it is said, had been impressed with the notion some time previously, and by a curious coincidence had matured his plan sufficiently to be in a position to make an application for a patent on the very day that Mr. Somerville addressed us at Dublin. The patent, however, bears the subsequent date of November the 28th, 1871.

The mention of this subject naturally leads me to draw your attention to another invention, a model of which is now before you, and which has for its

object also the prevention of choked ascension-pipes, or, in the event of their becoming choked, affording ready means for the removal of the obstruction. This the inventor, Mr. Box, proposes to do by making the ascension-pipe of comparatively thin wrought-iron tubing, which he believes will be far less likely to become heated to such a degree as to convert the tar into pitch than it would if made of cast iron of the ordinary thickness. Should this pipe, however, become choked through any unforeseen cause, an arrangement is provided for removing the offending pipe, and replacing it by another in a remarkably short time, leaving the foul pipe to be cleaned out at leisure.

Messrs. Fenner and Versinoun have lately patented an invention for manufacturing anthracene, samples of which are on the table for your inspection. Anthracene is a solid chemical compound made from the tarry residuum of the manufacture of gas, and since the discovery was made about three years ago that it might be converted into alizarene—which is the colouring principle of madder—it has become a highly important article of commerce. Up to the present time the supply of anthracene has been limited, owing to the means of its production being limited. It has hitherto been obtained only in the distillation of gas tar, when it passes over with the least fraction of the oil, and from which it is afterwards separated. By the new process, as stated by the patentees, anthracene may be obtained by distilling coal tar pitch, which yields about 2 per cent., or one ton, of anthracene from 50 tons of pitch. This article is in great demand, and its present market value is about £400 per ton; therefore, we may look upon this invention as an important branch of industry, which will increase the value of one of our residual products.

Another invention of considerable importance in street lighting has been introduced by Mr. Skelton, who has invented and patented a new description of lamp for street lighting. The principle of the invention is the application of reflectors, in order to bend down and utilize the amount of light which is at present wasted by upward radiation. It is manifest that the rays of light from a street lamp which now strike the eye of a spectator placed on the ground, are only a small portion of those actually emitted by the flame. The rays which pass through the upper portions of the sides of the lantern, or through its sloping roof, are entirely dissipated, or, at the best—when partially and imperfectly reflected by clouds or atmospheric particles—become visible only in the form of the lurid glare which overhangs a distant town. Mr. Skelton estimates that about two-thirds of the light given by the gas-flames are lost in this way, and he has arranged strips of silvered glass in such a manner that the loss will be effectually prevented. The upper half of each side of the lamp, and the whole of each side of the sloping roof, are occupied by a frame, in which the strips are placed, with their reflecting surfaces downwards, in a manner somewhat analogous to the laths of a Venetian blind. The precise character of the effect produced will depend upon the distance of the strips apart, upon their width, and upon their angle of inclination; but the general result is—subject to small variations—that the street receives three times as much light as would fall upon it through lanterns of the ordinary kind. The frames holding the strips are glazed on both sides, and made dust proof, so that the mirrors will not themselves become soiled or tarnished, and the reflector, as a whole, can be cleaned in the ordinary way, by simply wiping the glass. This plan has been most successfully applied to the lighting of Waterloo Bridge. It is a very great improvement, and in no department of gas lighting are improvements in this direction more needed.

Our coal supply, both present and future, must next claim our most serious attention. A report from the Royal Commission appointed to consider the subject has lately been issued, in which they assume 4000 feet as the limit of practicable depth in working, making allowance for waste and loss. This gives the quantity of coal still lying available beneath the surface of the United Kingdom as 90,207,285,398 tons—that is to say, considerably more than 90,000 millions of tons. This is exclusive of beds less than a foot in thickness. The hypothetical coal-beds of the south of England are also excluded from the calculation. But the estimate lies within still narrower limits, seeing that it is confined to areas within which the coal-bearing strata are at the surface, or have been proved by mining operations to underlie more recent formations. Geological principles lead to the conclusion that large tracts of coal exist under the Permian, new red sandstone, and other superincumbent strata, in districts where the fact has not yet been demonstrated by actual exploration. If these unexplored coal-beds are taken into account, they add 56,273 million tons to our reckoning, constituting a total of more than 146,000 millions of tons. If we extend the depth beyond 4000 feet, we get still more; but, for the present, we leave that out of the account. Let us see, therefore, how long the 146,480 millions of tons will be likely to last. In 1869 the quantity of coal raised in the United Kingdom exceeded 107 millions of tons. Professor Jevons, in his work on "The Coal Question," which appeared in 1865, estimated that the rate of growth, in the aggregate annual consumption of coal, amounted to about 3½ per cent., reckoning each per centage on the previous year's consumption. On this basis, he reckoned that the consumption in 1871 would be nearly 118 millions of tons. So far as can now be computed, the quantity of coal raised in the United Kingdom during last year was about 115 millions. Professor Jevons further showed that, at his computed rate, the coal raised in the United Kingdom would amount to no less than 2607 millions of tons at the end of a century. Upon this assumed rate of increase the whole quantity of coal reported available by the commission would be exhausted in 110 years. While it is admitted that Professor Jevons's theory has up to this time nearly accorded with observation, the commissioners object to the supposition that the annual per centage of increase in the consumption of coal will continue unabated for any considerable period. Mr. Price Williams, who has given great attention to questions of this kind, and who has been employed by the commissioners in matters of calculation, lays stress on the fact that, although the population of the United Kingdom is rapidly increasing, yet the rate of the increase is diminishing. This is a principle which Professor Jevons has not recognized, and when it is applied in correction of his theory, the duration of the coal supply is extended to a period of 360 years, the estimated population of Great Britain at the end of that period being 131,700,000. The commissioners also give a calculation based on an arithmetical instead of a geometrical increase in the rate of the consumption of coal, simply adding a constant quantity equal to the average annual increase of the last 14 years, taking that at 3,000,000 tons. Upon this basis the consumption of coal a hundred years hence will have risen to 415 millions of tons per annum, and our available supply would then be exhausted in 276 years, a period considerably shorter than that allowed by Mr. Williams, who, while taking a geometrical ratio also, reckoned that it would be a decreasing one. There is yet another view, which the commissioners regard as the extreme opposite to that of Professor Jevons. It is that from this time forward the population, of the whole country, and the consumption of coal per head of the population will remain constant, or will merely oscillate without advancing. Taking, therefore, the present consumption of 115 millions of tons per annum, the supply would be exhausted in 1273 years. This may be called the full length of our tether, and it is certain that we should feel an inconvenient tightness long before the end was reached.

Supposing that coal could be worked at a greater depth than 4000 feet—and the main difficulty is that of the very high temperature met with at such a depth—we might add 48,465 millions of tons to our store, including the quantity believed to exist beneath the Permian formation. Assuming the whole to become available, the 360 years allowed by Mr. Williams would be increased to 433; the 276 years based on the arithmetical ratio would become 324 years, and the 1273 years based on the theory of a stationary consumption would be lengthened to 1695 years. As the commissions observe, the whole question is subject to contingencies which cannot be foreseen, and every calculation involves something speculative. What science may do for us we cannot say but clearly our coal supply is by no means inexhaustible.

Unfortunately our present supply of coal causes us far greater anxiety than anything that may hereafter happen from the exhaustion of the coal itself. We have abundance of good coal workable at controllable depths, but owing to the perversity of men, and the unsettled state of our colliery labour, the supply as now raised falls very far short of the demand. The consequence is that the market price has lately risen from 50 to 75 per cent. To gas companies this is the most serious matter that has ever happened. They have had to contend against a large increase in the price of labour of the men employed in gas-making, and this enormous rise in the raw material, in addition to the increased cost of labour, will most injuriously affect the dividends of gas companies, and must of necessity compel many of them to increase the price of gas to the consumers. In some cases this can be done, but in other cases companies controlled by statutory power are restricted to a low maximum price, and in numerous cases they are already charging up to their maximum. Consequently these companies are placed in a grave position, and cannot obtain relief without the consent of Parliament. The existing state of things should not be lost sight of in future legislation, for it is inconsistent to have a fixed and unalterable maximum selling price when the cost of manufacture is subject to the great fluctuations under which we are at the present moment so severely suffering.

Another matter of vital importance claims our attention. I refer to the growing tendency of local authorities to absorb the property and business of gas companies by powers conferred upon them by Parliament. In most cases the power of the local authorities is exercised in direct opposition to the wishes of the shareholders of the companies so absorbed. The Legislature, judging from the past, intend to countenance and assist all corporate bodies in effecting this object, and I think that we may fairly predict that in the course of a few years all the principal works in the kingdom will change hands in this way. In the present session of Parliament no less than seven corporate bodies have obtained compulsory powers to purchase the gas-works in their respective towns. There have also been several transfers of works from companies to the local authorities, thereby disturbing a large amount of capital invested in private enterprise. There are, no doubt, good and legitimate grounds of objection to the existing state of these compulsory purchases, but I fear we are helpless in the matter, and must, therefore, in this case submit to the powers that be. At the same time we must prepare for these changes, and put our respective undertakings in such positions as that they may be able to bear the scrutiny, and of themselves to refute the highly coloured, prejudicial, and overwrought representations that are made in some cases respecting the property corporate bodies desire to become possessed of. We must be well prepared for these attacks, and be true to the interests we represent, and endeavour to obtain for the shareholders of our companies a sum that will adequately compensate for the loss of the property they have matured, and which they have most reluctantly to relinquish.

In concluding my address, I wish to offer to gas managers a few practical suggestions for their consideration. In our official capacities we are subject to much misrepresentation, and the public appear to view us with no small degree of distrust. In some cases it is alleged that we pump air into the gas, in others the complaint is made that, although the price of gas is much cheaper than it was formerly, gas bills are heavier than ever; and it is strongly hinted that either something is wrong in the meter, or that some legerdemain is practised by the representatives of the gas company supplying them. Consumers also complain of insufficiency of pressure, blackened ceilings, and a number of other defects. In practice, you are aware that in nine out of ten cases of complaint the cause is some local defect; it is often either improperly constructed, or worn-out burners, which consume, in many cases, double the quantity of gas that good burners would, and yet give only half the volume of light. Low illuminating power and blackened ceilings may also be traced to the same cause. Defective pressure frequently arises from cheap, ill-constructed gas-fittings, and pipes which are quite insufficient to convey the quantity of gas required to give an adequate supply. In these matters gas companies are, as compared with water-works companies, placed at a disadvantage, inasmuch as the water companies have full power and control over the size and strength of pipes, and the character of fittings used by the water consumers. But in the case of gas companies no such power is possessed, the matter being left in very many cases to unskilful gas-fitters, whose object is to obtain the largest amount of profit on the smallest amount of charge to customers, who demand cheap work. Hence the most paltry and unsuitable fittings are frequently used, which forms a source of constant complaint, and the consumer, from want of knowledge and appreciation, considers the default due to defective pressure.

In these matters I am constrained to say that, as a rule, the consumers have been left to take care of themselves, the gas manager considering that his duty was only to give a proper supply of gas to the meter, and, beyond that, he had no concern, the internal fittings of a house being a matter solely for the consumer to attend to. This conclusion may be correct, but it cannot be a good policy to act upon it in practice. I think it would be most beneficial to gas companies if their officers were to educate gas consumers, and to teach them the proper and most economical use of gas, advising them to have none but proper materials and workmanship. If this were done, we should not have so many allegations as are now made by consumers against companies, and the use of gas for cooking and other purposes would be more general than at present.

With regard to the manufacture of gas, every possible care must be taken to supply it in a pure state and of good illuminating power. We must not lose sight of the fact that chemistry has made considerable advances of late years, and the tests now used to detect impurities are much more searching and delicate than they were. The science of chemistry should be better understood by gas managers than it is at present—in fact, it becomes a necessity, since we have metropolitan gas referees and duly qualified officers in various parts of the kingdom, who give their official reports of the quality of gas supplied to the local authorities, and otherwise detect our shortcomings. We ought not to complain of these severe tests, but hail them with satisfaction, and work hand in hand with inspectors and chemists to make perfect the source of that light which has undoubtedly become one of the great necessities of the age.

We are particularly indebted to the metropolitan referees, and to the engineers who have assisted them, for the valuable practical reports they have made from time to time; and the last, on sulphur, to which I have before alluded, demands the careful attention of the gas manufacturer. Sulphur compounds are highly objectionable, and it has become a *sine quâ non* that a process of purification must be introduced to prevent any sulphur compound reaching the point of combustion at the burners. In considering this sulphur question attention must also be paid to its formation. A prevailing opinion exists that the high temperature at which clay retorts are now worked eliminates these products in larger quantities; whilst, on the other hand, some chemists of considerable standing are opposed to this theory. For instance, Berthelot has shown that bisulphide of carbon is dissociated into its elements quite powerfully at a bright red heat; and Sidot has published some experiments (in "Compte's Rendus," vol. lxix., p. 1303) wherein he shows that *more* bisulphide is formed at a dull red heat, and that at a heat approaching whiteness *none* is formed; also that moderate redness is the most favourable condition for its manufacture.

These conflicting views require to be reconciled, for they cannot both be correct. It should, therefore, be the careful study of the gas manager to endeavour to reconcile them, and to find out in practice where the truth lies. Other points requiring attention are condensers and scrubbers, which must be carefully examined and studied, and where they are found to be deficient they must be improved and brought up to the standard of perfection as far as can

be attained. Proper and complete apparatus is absolutely necessary in every works. Each minute point of constructure and working details demands the most scrupulous attention, in order that the ultimate results produced may be satisfactory. The progress of science demands that gas managers should make themselves thoroughly acquainted, practically as well as theoretically, with the chemistry of coal gas in all its minutiæ, especially with regard to the more prominent points I have indicated. By these means, and by the light of the reports of the gas referees, I trust that ere long the members of the British Association of Gas Managers will be as successful in producing chemically pure gas as they have been in working the large amount of capital entrusted to their care, and which they have done with such satisfactory commercial results. These results will be in no way impaired; but, on the contrary, cannot fail to be improved by a study of the teachings of science, whose fixed and inexorable laws can never be neglected with impunity.

Mr. R. H. JONES (Dover) read the following paper:—

ON THE VARIOUS METHODS OF COLLECTING GAS ACCOUNTS.

The collecting of an account seems a very simple matter—asking for payment of money due; but that there are various methods of collecting accounts, according to the nature of the trade, will be readily seen—the merchant's acceptances against bills of lading, the co-operative store where ready money is an essential, and the West-end tradesman who gives long credit. With gas companies, also, the method employed is by no means uniform. Two methods are in use with me according to the size and circumstances of the town In a moderate sized town, where quarterly payments have been in vogue for many years, it would be difficult to divide the year's payments into more than four. In small towns we find it desirable to divide the year into five periods—

1. July, August, and September.
2. October and November.
3. December and January.
4. February and March.
5. April, May, and June.

This division equalizes the payments more than the ordinary quarterly collections, and avoids the necessity of the collector calling on the consumers in the month of January, when Christmas bills drop in for payment.

The continental system of collecting gas accounts monthly (although it entails considerable additional labour both in the office and in inspection and collection) works, I believe, very satisfactorily, and, in the long run, I am told, pays for the extra cost, in the reduction to an infinitesimally small per centage of bad debts.

I think the five period system, if it could be more generally introduced into England, would be preferable to the present mode of collecting quarterly. I do not adopt the plan of the inspector leaving a ticket of consumption with the consumer when the index is taken, because I find that inspectors are not infallible, but sometimes make mistakes either in calculating the consumption or in taking the indices, and when a meter happens to cease to register in the middle of a quarter, an inspector cannot well detect this, and having once handed in a record of consumption to the consumer, the correction of the account, by the addition of the unregistered gas consumed, is a nice point of law, and one very difficult to get over with a consumer who is in the least degree disposed to be litigious. My inspectors, therefore, return their books to the office without giving any information to the consumer. The consumption is calculated and entered in the office, and the accounts prepared at home and in every case compared by the collector with the previous and corresponding quarters before the account is rendered to the consumer. This sometimes necessitates the retaking of the index, and the discovery that the meter has ceased to register, or that the consumption of gas has been reduced or increased, and the collector thus makes himself pretty well acquainted with any irregularity in the consumption before he asks for payment.

To ensure, as far as possible, accuracy in giving credit for moneys received, I provide that no moneys shall be taken without giving a printed receipt from a separate book provided with a counterfoil, of which one is in constant use at the office for the convenience of customers paying their accounts there, and one in the collector's hands. The counterfoils of these books are examined daily before closing the office, and the moneys received entered therefrom into the collector's cash-book. The collector also checks his cash every evening, and enters particulars. The result of this minutiæ is that from an experience extending over 12 years, and covering a total sum of nearly a quarter of a million of money, I know of only one case in Dover where a consumer called to say he had already paid the account sent in; and that solitary instance had reference to the sum of 1s. which a consumer had been charged for some little fitting job. The money had been paid at the office with the quarterly gas bill, and the particular item referred to omitted from the counterfoil; the collector, however, discovered he had a surplus of 1s. in his cash. That fact was recorded, and remained so till the consumer pointed out that the 1s. in question had been already paid, and the honesty of the collector was at once proved by the fact of the record of the surplus cash on the day the error was committed.

I also provide, as far as possible, for the prevention of defalcations through false returns of arrears. About five weeks before the termination of every quarter I cause a list of arrears to be made out, the total of which (with the cash previously collected during the quarter) must amount to the "sum due" at the commencement of the quarter. This arrear list is carefully examined, and in nearly every case the consumer has a lithographed letter sent him either mildly reminding him of his account unpaid, or, where it is absolutely necessary, plainly telling him that unless he forthwith cashes up, his supply will be cut off. My brother gas managers, no doubt, have learnt by experience that in certain cases one is obliged to be very plain in writing and saying what one means.

I find that by thus calling on and writing to consumers, the "collectable" arrears at the end of every quarter are reduced to about 1 per cent. of the private rental, and that during the last five years, out of nearly 1800 consumers in Dover, we have not had a single disputed account, nor do we scarcely ever resort to legal proceedings to recover our gas bills.

I will now refer to towns where the consumption of gas is small, and where no office staff is employed. In Ireland Mr. Anderson and myself light three such towns. There we have introduced the "five period" system in preference to quarterly accounts. Each consumer is provided with a gas pass-book, containing a couple of sheets of paper stitched in a stiff cover, about 6 inches by 4 when folded. It is ruled for dates, index of meter, consumption, amount due, arrears, total due, amount paid, and a column for signature of the person to whom the cash is paid. The manager or collector has a similarly ruled book, about half as large again, and containing a sufficient quantity of leaves to allow an open page for each meter (a copy is annexed to this paper). This latter book combines a rental-book and ledger, and lasts for four years. It shows at a glance the consumption of gas, period by period, or quarter by quarter, and the amount due for arrears, and whether the consumer always has a clean account at the end of every period or quarter, or if he is a frequent or constant bad paymaster. With the rental-book in his hand, the manager calls on the consumer, inspects the meter, and can make up the account and collect the rental at one and the same time, for his own pocket rental-book, or the consumer's "pass-book," enables him to see, by comparison with previous periods or quarters, if he is correct in the amount he charges. I do not think this latter system is desirable, except in small towns, where the manager is the "multum in parvo" of the concern.

No. 16. DANIEL MURPHY, PATRICK STREET.

Date.		State of Meter.	Gas consumed. Cubic Ft.	Amount Due.	Fittings.	Arrears.	Total.	Date of Payment.	Amount Paid.	Signature.
1871,				£ s. d.	s. d.	£ s. d.	£ s. d.		£ s. d.	
January	31	563	..	..	..	..	..	..	..	
March	31	603	4,000	1 0 0	..	..	1 0 0	May 14 . . .	0 15 0	J. M. C.
June	30	628	2,500	0 12 6	..	0 5 0	0 17 6	Aug. 8 . . .	0 17 6	J. M. C.
September . . .	30	656	2,800	0 14 0	..	..	0 14 0	..	..	..
November . . .	30	692	3,600	0 18 0	..	0 14 0	1 12 0	Dec. 2 . . .	1 0 0	J. M. C.
1872.										
January	31	742	5,000	1 5 0	..	0 12 0	1 17 0	Feb. 5 . . .	1 17 0	J. M. C.

Mr. H. P. STEPHENSON (London) said according to Mr. Jones's description, Dover was a very happy place, and he only regretted that his own experience did not altogether agree with that of the writer. There was one point in reference to the collection of accounts upon which Mr. Jones had not touched, and that was the desirableness of inducing the collectors to collect as quickly as possible. He had himself found, in a great number of instances, that by increasing the commission in the earlier months, and reducing it in the latter months, and even adding at the end of the quarter a fine for all moneys not collected, there had been a strong inducement created to complete the collection at the earliest practicable period. This was a system which had been adopted by one of the great companies in the south of the metropolis, and from which they derived great advantage. He thought he was right in saying the arrears of that company were rather more than those of happy Dover—viz., about 2 or 2½ per cent., as against 1 per cent. In the district of the Crystal Palace Gas Company at Sydenham, to which he alluded, the collection at one time was only about 56 per cent. of the charge, whereas upon the system now adopted it amounted to more than 97 per cent. The company had five collectors, and at the end of each quarter the whole of the arrears were taken out of their hands and placed in the hands of a special arrear collector to recover. He believed that if a system of this kind were generally carried out gas companies would avoid those cases of defalcation over which sometimes they had to mourn.

Mr. JONES said he quite approved of the suggestion respecting the appointment of an arrear collector in the case of a large company, but the paper he had read did not apply to large companies.

The morning sitting then closed.

The first paper read at the afternoon sitting was by Mr. Mellor, on Dr. Eveleigh's improvemeats in the manufacture of gas.

Mr. MELLOR introduced his paper by remarking: About a month ago your worthy president asked me whether I could read a paper on this subject before the association. I had no idea at that time of doing so, at least, in the present state of things; but, yielding to his request, I have endeavoured to put a few items of information respecting the patent gas process together, which I have much pleasure in laying before you. They relate more particularly to the mechanical portion of the question. The whole process, as you are, perhaps, well aware from the statements made in the JOURNAL OF GAS LIGHTING, is now under the investigation of two eminent men, and pending their inquiries I have felt it my duty not to enter much into the question of the chemical portion of the invention. Had I done so, it would, as it were, be taking the ground from under their feet; and I am fully aware that they can deal with the matter far more satisfactorily than I could do. With these few words, I will proceed to read what I have to say

ON EVELEIGH'S PROCESS OF GAS MANUFACTURE.

The object I have in reading this paper is to describe the particulars and details of the system of making gas as patented by Dr. Eveleigh, and to give to my fellow gas engineers the results of my own experience arrived at after carefully examining the method on a small scale at the works at Peckham, and also the practical working on a large scale at the works of the East Barnet Gas and Water Company, where, during the last five months, the gas supplied to the town has been made on this principle.

I would wish it to be clearly understood that although I have endeavoured, as an engineer, to assist Dr. Eveleigh to arrange the form and details of the apparatus now used in the manufacture of the gas by his method, so as to render it as nearly as possible self-acting, I have nothing whatever to claim in regard to the principles of the invention, the merits of which, whatever they may be, are due entirely to that gentleman, who has devoted many years of his life to the consideration of this subject.

The system patented by Dr. Eveleigh may briefly be stated to be "the manufacture in the first place of gas from coal under a comparatively low temperature in the retorts of the ordinary shape; and, afterwards, converting into gas the greater portion of the rich oils or tar produced by the first part of that process." These two operations are carried on simultaneously, and the two gases are mingled together as soon as they are generated, and pass on to the condensers and purifiers in the ordinary manner in a gas-work.

The first patent taken out by Dr. Eveleigh was dated the 7th of January, 1869, No. 45, and had for its object the conversion of the coal and the whole of the oils and vapours into permanent gas in one continuous process in a manner somewhat different from that patented by Mr. Basford, and, at the same time, to purify the gas by passing it through heated chambers filled with a permeable material consisting of a mixture of charcoal, chalk, lime, iron filings, &c. This method although successful to an extent somewhat greater than what may be called experimental, was found to have some difficulties in manipulation, chiefly in regard to the deposits of carbon in pipes, and the before-mentioned permeable materials, and it became necessary to consider how these difficulties could be overcome, and, at the same time, secure the rich gases which the oil contains.

After numberless experiments, and changes in the form of the apparatus, Dr. Eveleigh found that the best results were obtained by the plan now adopted—namely, that of vaporizing the oil and oily matters *from the surface*, and thus turning all the richer and more volatile portions of the oils into gas, leaving the heavier unvaporizable bodies to fall to the bottom of the vaporizing pan, where they are allowed to accumulate to a certain extent, and whence they are drawn off in the shape of pitch, which, when cooled, becomes hard like the specimen here shown. This system was included in the second patent, taken out on the 21st of February, 1871, No. 443.

The drawings show the whole of the apparatus, beginning with the general arrangement of the retort and hydraulic main adopted for the first distillation of the coal.

The retorts are by preference in section an oval or D shape, with the lower corners well rounded to facilitate the circulation of the heat in the oven. These may be arranged in benches of any convenient number; those at Barnet are set in beds of five to one fire. The coal is placed about 8 inches thick in the retort, which of this size—24 by 16 inches and 9 feet long—will contain a charge of from 4 to 5 cwt. This retort is heated to a dull red heat in daylight, or about from 1200 to 1300° Fahr., which experience has shown me is the most suitable temperature at which the coal should be distilled for all purposes. The gas passes off by the eduction-pipe placed at the upper part of the end of the retort (for reasons which I will hereafter explain), and then down through the dip-pipe to a vessel which I will call with, your permission, an hydraulic main condenser. The gas then passes through the leading-off pipe, to the ordinary cooling apparatus, scrubbers, and purifiers, on its way to the gasholder in the usual manner.

The eduction-pipe is placed at the back of the retort in order that the hot gas, containing, as it does, its oils in suspension, may be carried off as quickly as possible before any condensation can take place in the retort, and where, if the gas remained too long in contact with the heated surface, it would be decomposed and would deposit its carbon, and thereby lose a portion of its illuminating power.

The oils which are condensed in the cistern below the dip-pipe are of rather a light specific gravity, very little heavier than water, and in quantity (including that deposited in the leading-off pipe and condensers) about 30 to 40 gallons per ton of coal, and varying more or less with the quality of the coal. A very small quantity of ammoniacal liquor (from 3 to 6 gallons per ton) is also deposited. These proportions vary as a matter of course with the intensity of the heat at which the coal is distilled. The oils are received together in the ammoniacal liquor in the tar-well, from which the oil is passed into a cistern placed high enough to allow it to run down to the oil distillation apparatus.

This apparatus, which we term the redistillation retorts, consists of three vessels—

1. The vaporizing pan.
2. The intermediate chamber, with a diaphragm across; and
3. The charcoal cylinder.

These are set from the furnace in the reverse order in which they are numbered, for the oil enters the vaporizing pan (1), the vapours then pass up the ascension-pipe through the intermediate chamber (2), and lastly through the charcoal cylinder (3), where it is converted into permanent gas; whereas the heat is first applied to the charcoal cylinder (3), where it is required to be the greatest (the best temperature, as far as my experience goes, is about 1600° Fahr., or a bright red), then it circulates round the intermediate chamber (2) at about 1100° Fahr., and passing through the nostrils under the arch, over the top of the vaporizing pan (1), where it is sufficient to convert the oils into vaporous gas at a temperature of about 800° or 900° Fahr.

These oils, as you observe, run down from the cistern into which they are pumped from the tar-well to the cock placed above the funnel of the inverted syphon, which acts as a seal to prevent the vapours escaping. The oil is admitted at the rate of about 6 gallons per hour, and it runs down through the pipe into the vaporizing pan, which is filled with oil to above the height of the lower test-cock. The fresh oil flows over the surface of the heated oils in the vaporizing pan, and does not immediately descend to the bottom or mix with the heated oil to any great extent, and thereby that which has been an insuperable difficulty in making gas from oils—any violent agitation and gurgitation—has been prevented. The lighter portion only of the oils is vaporized, and the heavier bodies gradually assuming a greater density as the vapour passes off, fall to the lower part of the pan. These are discharged about every twelve hours, and when cooled become pitch of various degrees of hardness, according to the length of time they are exposed to the heat of the chamber.

The vapour rises up the ascension-pipe, and passes through the intermediate chamber, where it is gradually heated to about 1100°, or a very dull red. The object of the diaphragm is to prevent the passage of unvaporized oil into the charcoal cylinder by the sudden passage of the gas and vapours through the intermediate chamber, and also in the case of any possible gurgitation of the oil in the vaporizing pan, to intercept the frothy, oily matter which runs back again through the dip-pipe into the pan. The gas and vapours then pass downwards, permeating through the incandescent charcoal in the charcoal cylinder, the vapoury matters being decomposed, and the oils thus converted into permanent gas. The gas then passes at the back of the apparatus from the exit-pipe at the bottom of the cylinder to the condenser, where any oily vapour which has not been thoroughly decomposed in its passage through the charcoal cylinder is recondensed, and returns to the tar-well, where it mixes with the fresh oil from the first distillation of the coal. The gas at this point is mingled with that of the first distillation, and the two gases pass on together to the condensers.

The most important feature in the manufacture of gas by this process is the heat at which the coal is distilled in the retort, for on this, in a great measure, depends the quantity and quality of the gas obtained, and what is most important, the quality of the oily matters; for if too great a heat be applied, the gas will have less illuminating power, a greater amount of sulphur in the shape of —to use the "referees" phrase—"sulphur compounds other than sulphuretted hydrogen" will be formed, and the oil will be rendered almost useless for further treatment for conversion into gas, and if too low a temperature be used, there will be but a small quantity of permanent gas generated, and a greater quantity of oil, whilst the residue, in the shape of coke, would be of very little use.

In the distillation of coal at a high temperature the sulphur combines freely with the carbon, giving rise to the formation of bisulphite of carbon, but a portion also of the sulphur unites with the earthy compounds and carbon in the coke, while another portion passes off as sulphuretted hydrogen; whilst in the distillation of coal at a low temperature almost the whole of the sulphur passes over as sulphuretted hydrogen, a portion of which unites with the ammonia, forming hydrosulphuret of ammonia, which is readily absorbed by water and gradually becomes sulphate of ammonia, free hydrogen passing on with the gas; hence, in the latter process, the coke is freer from sulphur, and little or no bisulphide is formed.

So far as my experience goes, I have found that a dull red heat, or temperature of what I should consider about 1200° to 1400° Fahr., is the best for all purposes. The charge of coal for a retort 9 feet long, 24 by 16 inches in section will be about 4 to 4½ cwt., and this, at the temperature employed, requires twelve hours to obtain all the gas from the coal. From several trials of Norfolk Silkstone coal made by me at the works at Peckham, I have selected, as a fair average, the following, as showing the rate of production of gas at each hour during the charge, which weighed 4 cwt.:—

1st hour	190 feet.	7th hour	150
2nd „	240	8th „	140
3rd „	170	9th „	130
4th „	150	10th „	120
5th „	150	11th „	110
6th „	150	12th „	60
		Total	1760

The total produce was thus 1760 feet, or at the rate of 8800 per ton of coal, the illuminating power being 25 candles. The quantity of oil, as near as I could ascertain, was about 6 to 6½ gallons, or at the rate of about 30 gallons per ton of coal, with very little ammoniacal liquor. The amount of sulphur in the gas, according to Dr. Letheby's test, was 3·24 grains in 100 feet. This was, of course, a laboratory experiment, but it was made with a full-sized retort, and with a full charge of coal in the same manner as would be used in large works, and therefore the inference is that with a reasonable allowance for working on a large scale there ought to be a similar quantity of gas produced from every ton of coal. We have hitherto, at East Barnet, used only the Norfolk Silkstone coal, but in our experiments at Peckham we have tried many other kinds of coal, and obtained similar results, varying in quantity and quality with the relative richness of the coal.

The redistillation apparatus is arranged of such a size as to distil the whole of the oil produced from a bench of 10 retorts, and it is advisable that the oils should be used at once in the same proportion as they are obtained from the coal (for these oils are very volatile, and lose a considerable portion of their gas-producing properties if they are kept for any considerable time), and that the two gases be mixed in proper proportions, so that the quality may be regularly maintained.

The quantity of gas obtained from the distillation of the oil is about from 100 to 150 cubic feet from a gallon of oil. I have, as yet, had no reliable means of testing the illuminating power of this gas separately, and as it is not intended by the inventor that it should be used separately, but that the two gases should be mixed as soon as they are generated and used together, we must take the results of the two combined processes in endeavouring to ascertain its value.

The quantity of gas which, in my opinion, may be relied upon as obtainable from the Norfolk Silkstone coal by the combined process, will be from 10,000 to 11,000 cubic feet to the ton, and as the oil gas is not so rich as that from the coal, the illuminating power is considerably reduced by the mixing, the average being a little over 20 sperm candles from that coal.

The duration of the charge in first distillation of the coal being 12 hours, the quality of the coke is much improved, it becomes much harder, and consequently there is less breeze. The quantity produced is also greater, averaging in the Silkstone coal used at Barnet about 14 to 14½ cwt. per ton of coal. The consumption of fuel, in consequence of the low heats at which the retorts are worked, is less than it would be with the present system of high temperatures, but as there is also the second distillation to provide for, the fuel account may be taken to be about the same on the whole as by the present system in ordinary works of the same magnitude.

Up to the present time we have used iron retorts only, for at the requisite temperature there is little or no deposit of carbon in the retorts, and I do not think it will be possible to keep clay retorts gas tight at so low a heat. This, however, has yet to be tried, and if it can be done successfully, it will materially affect the cost of wear and tear. I have had considerable experience in the use of iron retorts under the old method, and from that experience, considering the low heats adopted by the Eveleigh process, I should unhesitatingly say that the wear and tear account might safely be taken at the same rate per 1000 feet as with clay retorts under the high heat method. There has not yet been sufficient time in which to do any more than form an estimate of this matter.

Any number of retorts may be set in one bench or oven, and I think it will be found advisable to have the redistillation apparatus arranged in proportion of 1 to every 10 or 12 retorts. This would open an inquiry as to the space required, and I admit that it is a very important question, especially to those who have their works in the middle of large towns; but it must be borne in mind that as much larger charges are used, and as the heats required are low, a greater number of retorts may be set in one bench. In my opinion, it will be quite safe to calculate that not more than one-fourth more space will be required for this process to make the same quantity of gas than for the ordinary method of gas manufacture. The labour cannot be more than that required in ordinary gas-works, for one man can easily attend to six sets of the oil apparatus, all that is necessary being to attend to the furnace and see that the oil is kept flowing regularly, and once in every 12 hours, or thereabouts, to discharge the pitch from the vaporizing pan.

Having now described the apparatus and the manner of working the process, and having in the course of the paper given you my opinions on the production of gas and of the residual products and other matters, I now come to the questions which most of you will agree with me are the most interesting to every one concerned—Will it pay? What is its value commercially? Is there any practical difficulty in adopting it in daily use on a large scale? On these three questions the merit or failure of the system depends. Now, I take it to be the duty of every one connected with gas interests to inquire into these matters, and when any new invention or process is brought to their notice, having for its object an

improvement either of the quality or purity of the gas, and also professedly giving an increased quantity from the same amount of coal, to see whether there is any truth in the statement set forth by those introducing them; and to this object I have very naturally turned my attention as regards this process.

Dr. Eveleigh states that by his process the following advantages are obtained:—

1. That the quality and illuminating power of the gas are much greater from the same quality of coal.
2. That the sulphur impurities are very much smaller than by the high heat system.
3. That the cost of the gas per 1000 feet is less.

These, if they can be justified, are very important results, and it now becomes my duty to give you in a few words the result of my own experience during the twelve months I have had my attention constantly on the subject. It would be useless and perfectly unprofitable to put down the figures as to the exact cost of the gas per 1000 cubic feet at the station meter, for in every town and in every gas-works, large or small, the individual items bearing upon the cost of gas are different in every case, both as regards the value of coal and coke and the other residuals, the cost of labour and materials, and other local circumstances. I can only give you the data I have arrived at, and it will be for each of you who desire it to form your own estimates according to the local circumstances of each case.

The coal I have used at East Barnet is that from the Norfolk Silkstone pits, belonging to Messrs. Newton, Chambers, and Co., and on that quality my data are placed. Many other coals have been tried experimentally, but on full sized retorts at Peckham, and the results have almost invariably been in the same relative proportion as regards quantity and quality as the same coals yield under the ordinary process. From this coal we obtain, including the oil distillation, from 10,500 to 11,000 cubic feet per ton.

The average illuminating power for the last two months is over 20 candles. The quantity of sulphur is under seven grains in 100 cubic feet.

These are results obtained practically at the East Barnet works during the last five months, and the testings for quality have been made strictly under the "referees" rules at a distance of 1100 yards away from the gas-works, and on the ordinary main-pipes of the town. In addition to the above three points, the following are the conclusions arrived at in my own mind as to the merits of the system, whatever kind of coal may be used:—

1. That the quantity of gas made is greater, and the quality much better, than by the ordinary method.
2. That the labour is not more.
3. That the fuel will cost the same, or thereabouts.
4. That the wear and tear account will not be higher than by the ordinary method.
5. There is no difficulty whatever in the manipulation, nor choking of the eduction-pipes or apparatus.
6. That the gas, when made, is quite permanent, and produces no deposit in the mains beyond that of gas made in the ordinary manner.
7. The coke is greater in quantity and better in quality.
8. The space required to make the same quantity of gas in the same time will not exceed that required by the ordinary method by more than one-fourth.

And lastly, that the additional cost of the apparatus, including the oil stills, will amount to about £25 per retort in the first instance.

These are what I feel fully convinced are reliable data, on which the three questions asked may be answered; and, acting as the consulting engineer of the company who owns the patents, I cannot do more than give my opinion in the way I have. For myself, I have no doubt whatever that all the questions may be answered satisfactorily, and I strongly recommend the system to your careful attention.

The works at East Barnet are open to any member of the association who desires to see them, and every information will be given by the superintendent to visitors.

I fear that I have made my paper, though very imperfect, yet much too long, and that some of the details given are dry and uninteresting, and, perhaps, many of you will doubt the accuracy of the opinions I have given. I may be wrong, for I am not infallible. I can only say they are the honest convictions of my mind, and as such I give them to you *quantum valeat*.

To those engineers and managers who are bound by their respective Acts of Parliament to a high standard of illuminating power, it seems to me to be invaluable; for by this process the use of cannel coal, up to 20-candle illuminating power, may in many cases be dispensed with.

I have said very little of the chemistry of this matter; that is now under the examination of two very eminent men, well known in the gas world, and their report will soon be made on the whole subject.

The PRESIDENT invited observations upon the paper just read, and said he was sure Mr. Mellor would have pleasure in replying to any inquiries made, and in furnishing any further information on the subject in his power. He hoped the members of the association, as practical men, would not allow the opportunity to pass without a thorough ventilation of the question, which all would agree was a most important one. The tendency in the present day was to require from gas companies an increase in the illuminating power of the gas supplied by them. To meet this demand, the companies were put to very great expense in the purchase of cannel coal; and if, by any invention, the cost of production could be reduced, there was no doubt it would prove an immense boon. It was the duty of gas managers carefully to consider the question without prejudice, and when an opportunity like the present offered for obtaining information respecting a system whereby it was alleged that gas of a high illuminating power could be manufactured from common coal without the use of cannel, to avail themselves of it to the utmost.

Mr. CLIFT (Redditch) said, in opening the conversation, he felt bound to express his own feeling, which, he thought, was also the feeling of every gentleman present—viz., that the association was under great obligation to Mr. Mellor for the very able paper he had just read, and also for the fair and candid manner in which he had laid the whole matter of Dr. Eveleigh's process before the members. He confessed that he came to the meeting a disbeliever in the system—a disbeliever from having himself, some years ago, tried the process of making gas at a low temperature with very unsatisfactory results. It was a necessity at the time, because he was then working iron retorts, in which high temperatures could not be employed without very heavy wear and tear. He had also used a process similar, in some respects, to Dr. Eveleigh's for manufacturing tar into gas, and the results there, also, were by no means so satisfactory as those detailed by Mr. Mellor. In speaking of the invention now submitted for consideration, they must regard it, not exactly as Mr. Mellor had described it—viz., as one process—it consisted, in reality, of two distinct processes. There was first the manufacture of coal into gas in iron retorts at a low temperature, and, secondly, a subsequent manufacture of the resulting tar into gas. Now, all gas makers, especially old gas makers, knew what it was to use iron retorts worked at a low temperature, and that they could not get 9000 or 10,000 cubic feet of gas per ton of coals in them as they could with clay retorts. The first process of Dr. Eveleigh's was a going back to the most antique method of making gas—the method by which Clegg made it in the first instance, and which certainly could not, as a rule, be adopted for economy's sake. By the process under consideration a larger quantity of tar was produced than by working at a high temperature, because this product was not decomposed and converted into gas. It was then proposed to take that tar and subject it to another and entirely distinct manufacturing operation, just as much so as if they bought tar in the first instance, and employed it in the production of gas. There was a distinct apparatus for the purpose, and so many cubic feet of gas were obtained from a given weight of tar. His own experience was that from 10 lbs. of tar he could make 100 feet of gas. But 10 lbs. of what tar? The very richest product from tar—the naphtha, the aniline. What was that worth per gallon? It was worth 1s. 3d., and from a gallon of that product it was proposed to manufacture gas to the value of 3d. The rich oil of naphtha, from which aniline was obtained, was worth 1s. 3d. per gallon in the market, and, with the whole of the apparatus which had been described, it was proposed to make this into threepennyworth of gas. He would ask any one whether this was likely to prove a paying process. Mr. Mellor said he would not go into the details of the profit and loss very minutely, but if he had done so, and had told the meeting what was the value of that rich portion of the tar which he converted into gas, there would have been no difficulty in arriving at the conclusion to which he (Mr. Clift) had arrived. Then Mr. Mellor stated that the cost of fuel in the Eveleigh process was much about the same as in the present mode of manufacture. Now, was it reasonable to suppose that with these two distinct processes for the production of 11,000 feet of gas, and with two fires constantly going, the cost of fuel would be no greater than in the production of 9500 feet or 10,000 feet of gas with one fire? He thought the thing was palpably erroneous, and that it must be evident the cost of fuel would be greater. As to the cost of labour he could not say much; probably not much additional labour would be required, assuming the correctness of Mr. Mellor's statement that no stoppages occurred in the pipes, and that the whole process went on without much attention. Of course, the redistillation process was to a certain extent self-acting. There was a cistern of tar above, the contents of which ran down at a certain speed into the evaporator. The rich hydrocarbons were evaporated in that chamber, and passed into the retorts, and he supposed the coke was seldom changed, and therefore the labour would not be great. Still, there was additional labour. With iron retorts making 7500 or 8000 feet of gas per ton of coal instead of 9500 or 10,000 feet, the labour must be greater in proportion to the quantity of gas made, because the charging and discharging were the same, the attention to the fires was the same, although from 20 to 25 per cent. less gas was obtained. To produce the additional quantity of gas, additional labour was required in the second process. What that was he could not say, and Mr. Mellor had very wisely left it to be ascertained by experience. He (Mr. Clift) did not propose to say anything further than that he admired Dr. Eveleigh, or any other man who, when he thought or believed, as no doubt he most thoroughly did believe, that he had discovered something of public advantage, was determined to follow it out and thoroughly investigate all its parts. If there was, after all, nothing in his invention, it would, like a thousand other things they had known, drop out of sight in the course of time; if, on the other hand, it possessed any practical value, these investigations would establish the fact, and the public would soon appreciate it.

Mr. ALLEN (Wellington) said he remembered about 13 years ago a patent was taken out by Mr. Basford for making oil or tar and water into gas, and he was so unfortunate as to allow the process to be tried at his works. It seemed to him to be a process in many respects similar to the one now under discussion. His experience, however, was that unless the thing was continually watched, there was a danger of accident with it, and in his case one night the whole place was blown up, the man in charge had his leg and the small bone of his arm broken, and the company had to pay his wages all the time he was necessarily lying idle.

Mr. H. P. STEPHENSON said he sympathized very much with the poor man whose arm was broken by Basford's patent, but he was happy to state that no such accident had happened at the Barnet works with Dr. Eveleigh's patent. He rose to point out to the meeting that there was a very material difference between this and Basford's patent. Mr. Basford conducted his process in an ordinary retort, and passed the gas so manufactured through a charcoal chamber. But here there was an entire redistillation of the oil produced in the first process. He felt a great deal of interest in this question, and his friend, Mr. Mellor, had kindly allowed him to see the works at Barnet. He quite admitted that the thing was in its infancy at the present moment, but he believed it would ultimately prove a most valuable discovery, and it struck him as a matter most worthy of consideration, particularly at this time, when the price of coal and cannel was increasing to so fearful an extent. By it—upon the word of Mr. Mellor, which they had no reason at all to doubt—they would be enabled to get from 10,000 to 11,000 cubic feet of 20-candle gas per ton of common coal. Mr. Clift, who spoke against the patent, said he never got that; Mr. Mellor said he had; therefore they had the testimony of the man who had eaten the pudding against that of the man who had not had any. And not only was the fact of production vouched for, but there was the additional fact that the gas of this high illuminating power had been carried to and tested at the burners at a proper distance from the works. There was one consideration which had occurred to his mind in the first instance as a most serious objection to the use of this process. Take the case of his own company at Sydenham. They had a rental of £50,000 a year. What would be the effect on that rental of supplying to the consumers gas of 20-candle illuminating power instead of 15 as at present? Of course, the result would be to depreciate *per se* the rental to the extent of a third or a fourth. Now this was an objection which would rise in the mind of a great number of persons who were not tied to a high standard of illuminating power as at Liverpool, Manchester, and in Scotland. Supposing the rental of his company reduced in the way he had mentioned, it would have a most serious effect upon their profits. But the way in which he looked at it was this—that even assuming the public were not induced by the higher illuminating power and greater purity of the gas supplied, at the same price as before, to use a larger quantity, he thought it would be found of advantage to the company to adopt this process in combination with the ordinary methods of manufacture, so as to obviate the necessity for employing cannel coal. By so doing, they would be able to supply to the public gas of, say, 16 or 18 candle power, so that, as in the case of his company, instead of lowering the price of gas which happily in past years they had been enabled to do, but which they might not be able to do in the future, they would be in a position to meet the demands of the consumers by raising the illuminating power. In this way, at all events, he thought the patent might prove useful to those gas companies which were not bound to a very high standard. In other cases, such as with the Brazilian companies, where a high illuminating power was demanded, the patent process would be valuable, because it would save the necessity for shipping cannel coal, and thus enable them to make their gas much cheaper.

Mr. FRASER (Inverkeithing) said Mr. Mellor had vouched his word as an engineer to two very important facts—first, that with the same quantity of coal he could by the new process obtain a greater quantity of gas; and, second, that the gas so obtained was of a much higher illuminating power. He (Mr. Fraser) had seen the gas made at Barnet, and had no doubt at all that the illuminating power was much increased—probably it was double that of the gas in ordinary use. Under such circumstances the question was well worthy of consideration and careful investigation by all gas managers, seeing how largely the price of coal was increasing. But there was one point which appeared to him ought to be explained, and therefore he would ask Mr. Mellor a question upon it. Would gas made in the way patented by Dr. Eveleigh be permanent, or would it be condensed into oil?

Mr. ANDERSON (London) thought the only point omitted by Mr. Mellor in his paper was how much pitch per ton he had obtained.

Mr. SMITH (Hyde) wished to know the difference in the specific gravity of the two gases—the gas made from coal, and that made from the oil or tar.

Mr. ANDERSON said he had the strongest desire imaginable to believe every statement made by Mr. Mellor, and that for two reasons. Mr. Mellor had placed the subject before the meeting in a most candid and gentlemanly manner, and it would be very much to his (Mr. Anderson's) interest if everything stated in the paper was reliable, because he was a manufacturer of gas, and had to purchase large quantities of coal. He was therefore in that mental stage of being open to conviction; but he confessed that he was not yet convinced, and he would state in a few words what occurred to him at the moment as being against the system now under consideration. This was the first time, he would venture to say, in the experience of any one present, in which they had heard of a larger quantity of gas being made at a low than a high heat, and he hoped it was a fact, as stated, that the gas so obtained was permanent. It was also the first time they had heard of low heats being able to produce gas as cheaply for labour as high heats, and he was afraid, while giving Mr. Mellor credit for the utmost sincerity in what he stated, that this was a point which he had not thoroughly analyzed and made himself properly conversant with. In the first place, Mr. Mellor stated that, with a retort 9 feet long and 24 by 16 inches in section, he carbonized 4 cwt. of coal in 12 hours. Now, in the ordinary mode of manufacture a retort of that size would take say 3 cwt. per charge, and there would be four or five charges per day, according as five or six hour charges were worked. There must, therefore, be a considerable increase of labour to obtain the same quantity of gas by the first process. Then as to the fuel account, he could not help thinking the cost must be much greater. His own experience was, that in consuming fuel at a high temperature greater calorific value was obtained from it than at a low temperature. In the next place, there was a second process to go through. Certainly this second process was very beautiful, and appeared to him very perfect. Probably it did require very little labour, but he did not think it would require so little fuel as was supposed, because it really made half as much gas as the first process, although there was only one redistillation apparatus to distil the oil from a bench of 10 or 12 retorts. This was a matter which, perhaps, was open to argument. The quantity of oil or tar obtained was about 30 gallons, and the production of gas from that was at the rate of 150 cubic feet per gallon, therefore there was between 4000 and 5000 feet of gas per ton manufactured from the tar alone. In the first process he believed that the cost of fuel must be more than by the ordinary mode of manufacture, and that in the second it would be from one-third to one-half of that. He was quite prepared to admit that the gas would be of a high illuminating power, because, as was well known, where low heats were employed, though less gas was obtained, it was always of a higher illuminating power than where high heats were used. He was obliged to Mr. Mellor for stating that the works at Barnet were open to the inspection of any members of the association who desired to see them. Whether that visit should be paid before the eminent doctors who were investigating this matter made their report was a question; perhaps if they went there with the report in their hands they would be better prepared to find fault, as it would be their duty to do if they saw it necessary, and thus give those in charge of the process the opportunity of putting pegs in all the holes they made. He wished it to be clearly understood that in anything he had said he had no desire to depreciate the merits of the invention; indeed, he should be happy should it prove to be a success. He only desired to indicate what he conceived were objections in a commercial point of view, and it would be a great satisfaction to hear those objections successfully refuted.

Mr. PRICE (Llandudno) asked Mr. Mellor to state upon what data he had come to the conclusion that only one-fourth more space would be required for working this process, to make the same quantity of gas, than for the ordinary method of gas manufacture. This was a very important question to those who might have to enlarge their works to adapt them to the new process.

Mr. HUTCHINSON (Barnsley) said he should be glad if Mr. Mellor would give some particulars as to how he ascertained the heat, the quantity of gas produced, and whether there was more coke and more tar than by the usual method of manufacture.

Mr. G. LIVESEY said he thought perhaps it was due to the association that as this system was now to be tried at the South Metropolitan works, he should state as concisely as possible, the reasons why he had recommended his directors to give it a trial. Before he paid a visit to the Barnet works he was very sceptical on the subject, for he took very much the view Mr. Anderson had taken, that this was the first time anything of the kind had been attempted, and he was doubtful whether it could succeed in this instance. He was not able to make any experiments at Barnet himself, but his friend Mr. Mellor, whom he had known for many years, gave him certain facts and figures in the same way that he had given them on this occasion, and it was from those facts and figures he had come to the conclusion that the thing was worth a trial. There seemed to be no doubt of this, that the gas produced from common coal was of extraordinary illuminating power, and also that it was of extraordinary purity. The point to be determined was, could it be so produced as successfully with regard to cost, as by the ordinary system, taking all the circumstances into consideration. That was well worth ascertaining, and therefore he recommended his directors to give it a trial. One thing which particularly struck him in connexion with the invention was the method of distilling the oil. Hitherto in effecting that object the heat had been applied round the oil chamber—at any rate not upon the surface of the oil. The result was to boil the tar and cause it to give off heavy thick carbon vapours which choked up the pipes. By this system the heat played over the surface and evaporated the more volatile constituents, leaving the pitch undisturbed to settle at the bottom. Although Dr. Eveleigh's plan seemed in some respects to be going back from the practice of later years, it was quite possible some of them might be mistaken respecting it. It was said at one time that steam-ships could never cross the Atlantic, and it struck him while Mr. Clift was speaking, that there was some analogy in the matter. Certain it was, that Mr. Mellor had succeeded in doing that which Mr. Clift found it impossible to do. If only on the ground that by means of this process they could make gas of a very high illuminating power without the use of cannel, the system was well worth a trial. Those companies which were under restrictions as to the quantity of sulphur allowed to be present and which were bound to a 15 or 16 candle standard, would find an advantage in making a portion of their gas by this system, and thus improve the average quality.

Mr. H. BROTHERS (London) said he was deeply interested in this matter, having been a cannel gas manufacturer all his life. He thought he might speak confidently when he said that he was able to make as much per ton or per mouthpiece as most people, but he certainly did not make anything like the quantity of gas he desired to make from Scotch cannel. In practice, he found that he was from 10 to 25 per cent. behind in the results obtained by chemists and experimentalists; and it struck him that the invention of Dr. Eveleigh's might come in to his aid in this matter. If cannel coal was distilled at a low temperature and the tar was redistilled in the manner proposed, he thought it quite possible to obtain the results which chemists stated as attending their experiments. He was inclined to believe that the invention would not answer commercially, as applied to common coal, and that in respect of coke, although Mr. Mellor stated that he got a greater quantity per ton, it was inferior in quality to that produced in the ordinary way, because it must contain a great deal of tar. With regard to labour, he agreed with Mr. Clift that the cost must be greater. Here there were two distillations, and not only so, but they were dependent upon human agency, which was very fallible. Every one present was aware that gas managers in London had the misfortune to be under the referees; and to be under the referees meant that they were bound to a minimum as to illuminating power and purity. They also knew from experience that if they used a certain portion of a given material they would produce a certain quantity of gas of a certain illuminating power. But supposing they adopted this process, and some carelessness in the working of the second portion arose, they might obtain an admixture of the two gases which would bring the illuminating power below the minimum, and thus expose them to the liability of a penalty. Then, it occurred to him that man could never make his compounds do as well as those which were provided in nature. In nature cannels were found of a certain quality which it was known by experience would give a certain illuminating power, but if they came to mix these, and to rely upon human agency, they would often be wrong. He thought it would require the greatest attention and care to manufacture—say 16-candle gas (which meant 17 in London)—by this process. He was quite convinced, from what he had seen at Barnet, that the wear and tear must be greater than usual, and that the cost of fuel would be higher. Although the heat required was not so high, the time during which the retorts were kept at work per charge was much longer so that the consumption of fuel must be considerably more; and in addition, to that, there was another fire to keep up. Under all the circumstances he was of opinion that at present prices the process would not pay as applied to common coal; but where very rich materials were employed in the product of gas, as in Brazil, which had been referred to, it might answer.

Mr. WARNER (South Shields) remarked that if the invention justified the encomiums of its advocates, and produced 20-candle gas from common coal, the consumers had a good friend in Dr. Eveleigh, because of the saving it would enable them to effect in dispensing with the use of expensive cannels. Mr. Livesey stated that at the South Metropolitan works they were about to erect apparatus in order to give the system a trial. He (Mr. Warner, would be glad to be informed what the cost of such apparatus would be, and whether the Patent Gas Company would charge a royalty for its use in the event of the experiment proving unsuccessful. Probably the company were so well convinced of the correctness of the principles upon which the process was based that they were prepared to erect apparatus and allow the process to be tried for the actual cost without expecting a profit out of the trial.

Mr. DARWIN (Longton) said he thought that at present prices selling tar must be as good as distilling it, so that as far as his company were concerned he did not see there would be any advantage in adopting the process.

Mr. PARLBY (Aylesbury) asked Mr. Mellor to state whether in carrying out his process there was any difference in the mode or cost of purification.

Mr. WOODALL (London) said there was one point which he felt very anxious to have made a little plainer, and that was as to the relative amount of work that would be done in the space of time mentioned as compared with the ordinary process of manufacture. Mr. Mellor stated that he had no doubt whatever as to the relative quantities of gas produced from the first distillation and the second. He thought he gathered from the paper what was the quantity of gas made from the coal, and as they knew the gross quantity it did not seem that there need be much difficulty in ascertaining the amount made from the second process. But as he understood the figures in the paper, it appeared that altogether with both processes the quantity of gas per mouthpiece with these very large retorts was under 4000 cubic feet. Now, if according to this invention the size of the retorts was increased, and the space required was increased, and additional apparatus was necessary for the second process, while at the same time the quantity of gas produced was less than that obtained under present arrangements, it certainly appeared to him that this must be rather a costly improvement. If the production of gas, too, was prolonged, the cost of fuel and labour must also be increased. On these points Mr. Mellor, who appeared quite disposed to give every information in his power, would probably be good enough to throw a little light.

Mr. IRONS (Gosport) said he should have been pleased to have some details as to the photometer testings. Gas made from two processes combined sometimes chemically and sometimes mechanically, and the illuminating powers varied.

Mr. HUNTER (Rochdale) wished for some further information as to the amount of labour required in working the apparatus. From what he could see a greater amount of skill was required in making gas according to this method than by the ordinary processes. In the practical operation of gas-making very much depended upon the stokers, and he felt somewhat doubtful of the results if they were to be intrusted with an apparatus which was more complicated and demanded more skilful manipulation than that in general use. He felt bound to take this opportunity of expressing his thanks to Mr. Mellor for the courteous and extremely candid manner in which he had brought this subject before the meeting, and also for his readiness to afford him all the information he sought when he visited the works at Barnet.

Mr. PEEBLES (Edinburgh) said he was probably the only person present who heard a paper read some time since by Dr. Macadam, on short time charges and the mixing of different qualities of coals, in which the writer showed, in a tabulated form, that the result of the combination of high quality coal and coal of an inferior description was to produce gas in large quantity and of a very high standard of illumination. By the process now under consideration the coal was distilled at a very low heat during a long period of time, and he (Mr. Peebles) imagined that at the tenth or eleventh hour the gas evolved must be of a very low illuminating power. The question was whether this gas would combine with the gas evolved during the first part of the operation and the gas distilled from the tar, and unitedly form gas of a high quality, and at the same time of good volume. Probably there was a chemical solution of the discrepancies between Mr. Mellor and the other gentlemen who had spoken.

Mr. MELLOR said he felt very much indebted to the members of the association for the very kind way in which they had received his communication, and the courtesy with which they had stated their objections and raised inquiries. He need hardly say that all which he had stated he thoroughly believed. He would proceed as briefly as he could to reply to the questions put to him. The first remark made and the first inquiry proposed was by Mr. Clift. That gentleman said he had been using iron retorts for a long time; that he got from 8000 to 9000 cubic feet of gas from them; that he worked them at certain heats, and that he found tar would not make gas so as to be profitable. Now if iron retorts were worked at a very low temperature indeed, not more than half the quantity of permanent gas would be generated, and there would be a large quantity of oil; whereas, if worked at a high heat, they absolutely destroyed the gas bearing properties of the oil, and it was of no use attempting to make anything of it. In working at a high heat in iron retorts a carbonaceous deposit was formed on the inside of the retorts, and they generated that which the referees made so much bother about, the troublesome compound bisulphide of carbon. This impurity had been, so to speak, very much thrust down the throats of gas managers lately, and that, too, in a very disagreeable form; but, after all, there was very much in the complaints made about it, and he was convinced that its presence was owing to the very high heats employed. Mr. Clift stated that he obtained 1s. 3d. per gallon for his tar, but he (Mr. Mellor) never before heard of tar selling at that price.

Mr. CLIFT: No; I said I obtained 1s. 3d. per gallon for the light oil distilled from the tar—*i.e.*, that which you take from the tar to manufacture your gas with.

Mr. MELLOR: The benzole you mean?

Mr. CLIFT: The naphtha.

Mr. MELLOR: I thought you said you made 30 gallons of tar per ton of coal, and got 1s. 3d. per gallon for it.

Mr. CLIFT: I wish I could. What I said was that the oil you take off to convert into gas is worth 1s. to 1s. 3d. per gallon in the market at the present time.

Mr. MELLOR: Allow me to ask how many gallons per ton, and then I can get at the result.

Mr. SPICE (London) said 2500 gallons of tar would produce 70 gallons of the oil which Mr. Clift stated to be worth 1s. 3d. per gallon.

Mr. MELLOR, proceeding with his reply, said Mr. Clift called the Eveleigh process two operations, but it was in reality only one, for the whole was carried on in the same place, at the same time, and by the same men. The first process was to make from 7500 to 8000 cubic feet of gas per ton from the coal, and as he took it, it did not matter whether they turned the oil obtained into a still and redistilled it at the same time, or whether they left it alone; the quantity of gas obtained in the aggregate was what they must base their calculations upon. Mr. Clift stated that he had been able to get 8000 or 9000 feet of 14 or 15 candle gas per ton from his retorts, worked in the ordinary way, whereas he (Mr. Mellor) had obtained 7500 or 8000 feet of 25-candle gas per ton, by adopting a proper heat, from the first distillation process. He then had from 30 to 40 gallons of oil, which he converted into gas—permanent gas—making, say, an aggregate of 11,000 feet per ton, to be within the mark. He had never been able to get more than 1½d. or 2d. per gallon for tar, even with benzole at 2s. 6d. per gallon in the market, and it was not worth that now. With regard to fuel, that seemed to be a very important question in the minds of some of the friends present. They all knew that if they burned their fuel as they ought to burn it so as to obtain the largest amount of calorific value, it did not matter whether they burned it at a high or at a low heat; there was a certain amount of heat to be obtained from the fuel, if proper attention was given to its economical consumption. Now in the heats employed in the Eveleigh process, from 1200° to 1800° Fahr., they must exhaust from the fuel in the same time very much less of its calorific property, so that as a matter of fact the fuel would last longer. They did not require so much heat to maintain a cherry red as to maintain a white heat; and when it was remembered that they put from four to five cwt. of coal in each retort to obtain 10,500 feet of gas per ton, by these two processes, it would be seen that they did not in reality require more fuel. His experience at Barnet was that during five months the fuel had not averaged more than 25 per cent., although working at great disadvantage, sometimes having 5 retorts going, sometimes 10, and sometimes 20, and the conclusion he had arrived at was that with so low a temperature in the first process they saved as much fuel as was required in the second process. Mr. Allen asked whether there was any choking of the pipes. To this he (Mr. Mellor) replied that in this process there was absolutely no choking at all of the pipes. During the time that Dr. Odling and Mr. Keates were examining the works, the eduction-pipes were untouched for 14 days, and when they were afterwards opened in his presence they were as clean as his hand. Mr. Stephenson, speaking of the invention of Dr. Eveleigh, very properly said that it would be a valuable auxiliary to gas companies, enabling them to make 15 into 20 candle gas; and what he (Mr. Mellor) would ask the members of the association to consider with regard to illuminating power was this, that in the present day the tendency of legislation was to raise the standard in this respect, and gas managers must be prepared to meet it. Now, as they could not very well make from any description of coal which came to London, except it might be the Silkstone, gas of 16-candle illuminating power without the admixture of cannel, this process came to their help in making gas of that description, avoiding the necessity to use cannel at all; and he recommended it to their attention on that account. With regard to the permanency of the gas, that was a point upon which he never had the slightest doubt from first to last, though he had thought it possible that like all other gases it might, if kept a long time, lose a little of its illuminating power. There was one thing upon which he had been sceptical—viz., whether the two gases would mix; and it appeared to him that this would be one of the greatest difficulties. To settle the question, he put the two gases into a gasholder, and introduced one pipe at the top and another at the water level of the holder. On burning from each, there was not a quarter of a candle difference in the illuminating power of the two gases, neither could he find any difference in the specific gravities. This satisfied his mind that there had been a thorough commingling of the gases. With regard to permanency, a test was applied at East Barnet, for which he was little prepared. At the time Dr. Odling and Mr. Keates commenced their experiments the whole of the gasholders were full, and it was determined to shut off the inlet and outlet pipes, and leave them in that condition till the experiments were finished. The gas was kept in the holders for 15 days, and on being tested was found to have lost only 1¼ candle of illuminating power. Further than that, the gas was tested at a distance of 1100 yards from the works; he selected a house at that distance so as to conform to the rules of the referees; and for four months there was no deposit appreciable at the syphon on the main. If the gas had not been permanent there must have been a deposit, but, in fact, there was none; *eryo* it was permanent. Upon that point he held a very strong conviction, and, therefore, he boldly stated in his paper "that the gas when made is quite permanent, and produces no deposit in the mains beyond that of gas made in the ordinary manner." Mr. Anderson asked the quantity of pitch obtained, but he did not ask what was the quality of the pitch. The quantity varied from 70 lb. to 80 lb. per ton of coal, and the sample on the table would be seen, upon examination, to be of a very soft, rich-looking character, and he thought it would be found to contain, except the benzole and the aniline, most of the other valuable products of that article. He could not say much more upon that subject, but perhaps Mr. Goddard, who knew more about it than any one in the room, could supply further information. He believed if carefully analyzed it would, as he had said, be found that, with the exception of the lighter hydrocarbons, this pitch contained most of the valuable properties of tar—the anthracene and other matters referred to by the president in his address. If that were so, it proved that the 3000 feet of gas—or 100 feet to the gallon taken out of it—was obtained to their hands for nothing. With regard to the remark made by Mr. Anderson as to going down to see the works, what he said was this—that ever since he had been in a position to show the works, he had never refused, to any engineer who had asked for it, the privilege of seeing them, and that he would be happy to see not only Mr. Anderson there, but every one else in the room. But he had been asked before he was ready to allow people to see the process. Had he consented, he would have had nothing to show them, and it would only have been to occupy the time of the applicants and his own to no purpose. In a new thing like this, many alterations had to be made in order to bring the operations into practical working, but for the last two months the works had been open to the inspection of any one, and if Mr. Anderson would pay them a visit he would be happy to devote a day to the examination of the process with him. In retorts of the size employed—viz., 24 by 16 and 9 feet long—he could put about 9 feet of coal, which was nearly 4¼ cwt. If he attempted to get all the gas out of that in six hours, he should fail in doing it; but by burning it for twelve hours, he got, with the oil distillation, nearly as much gas on the same space as was obtained in the ordinary method of manufacture, and therefore he thought he was quite within the mark when he said that one-fourth more space would be required in the new process to make the same quantity of gas in the same time. In reply to the question as to the specific gravity of the gas, he stated that he had not tried it by itself in such a manner as to be able to give any reliable information, but it would be ascertained much more satisfactorily than he could do it by the gentlemen now engaged on the investigation. Mr. Price mentioned something about the heavy charges, and said he could take off the gas in four hours. If a higher quality of coal or cannel was used, the time would be reduced to five or six hours. The higher the quality of the coal, the less time would be required to take the gas off; that was, he believed, the result of general experience. Mr. Jackson asked how he ascertained the heats. They were ascertained by Bailey's calometer. The quantity of gas was ascertained by the station-meter, and the quality by the referees test. Mr. Brothers would forgive him for saying that he quite disagreed with one observation made by him. He expressed his opinion that the coke made at a low heat was not so good as when a high heat was employed. He (Mr. Mellor) maintained that it was better. Coke, when made for foundry purposes, in coke ovens, was subjected to a low heat, which was gradually increased to a high heat, and exposed from 24 to 30 hours at a time. If drawn off at 5 or 6 hours, it was not so good as when left for 12 hours; and the longer it was burned, within reasonable limits, the better. With regard to the question of the cost of labour. The only labour required in the redistillation was to pump the oil up into the cistern, from which it ran into the stills, and to keep the fire going. The charcoal employed in the charcoal cylinder did not seem to depreciate in quantity, but it did in quality, and in time required to be changed—say, once in about two or three weeks. Every three or four days it was necessary take off the cover and loosen the charcoal. With these exceptions, there was little or nothing to do in the way of labour; and he thought he was right in stating in his paper that one man could easily attend to six of these stills without the least trouble whatever. In reference to the temperature at which he had been working, he had been chiefly guided by the amount of sulphur in the coal employed, so as to bring the quantity in the gas down to 6 grains per 100 feet, according to the contract with the Barnet Company. The lower the temperature, within reasonable bounds, the less sulphur there was in the gas; and as the temperature was increased 100° by 100°, so he got a grain or a grain and a half additional sulphur per 100 feet. With that exception, he saw no difficulty whatever with regard to dependence upon human or mechanical agency. He believed that any man with ordinary intelligence could attend to the process; and he was justified in saying so by the fact that, with the exception of the foreman, who was changed last year, the same men were employed now at the Barnet as were at work there before the new process was introduced. He had made all these statement in good faith, and must leave them with the members of the association to think over. If they required further information, he would be happy to furnish it on the spot at Barnet. One member asked whether the gas obtained was really of 20-candle illuminating power. He could only say in reply that the daily testings had conclusively shown it to be so, with one or two exceptions last month, when it went down to 19·59 candles. As to purification, he might state that no claim was made to interfere with this part of the manufacture, which could be carried on as in the ordinary way at gas-works. As to the quantity of gas per mouthpiece, he found that five retorts with twelve-hour charges gave 16,000 feet. The oil process brought this up to 22,500. Dividing that by 5 gave 4500 cubic feet per mouthpiece. He could not give the make per man at the moment, he could only say that no more labour was required per ton of coal used than usual, except for the distillation process, and the quantity of gas obtained from that covered the extra labour employed. Mr. Irons asked a question in reference to variation in illuminating power, in reply to which he would state that during the last two months the gas at Barnet had not varied more than 1½ candle between the highest and lowest point, and that the two gases did regularly mix he had already remarked. He believed he had answered what Mr. Peebles said about short charges. He did not think it was good policy to mix the coals in the distillation for gas. If they had a coal—say a cannel—which passed away its gas in three or four hours at a moderate temperature, and that was mixed in the same retort with a lower class coal, which took five or six hours, there was no economy in this; it was better to distil separately and mix afterwards. The only other question he had to answer was that put by Mr. Warner, and he was sure that no one would blame him for saying it was hardly likely that Dr. Eveleigh or those who worked his patent would allow it to be used for nothing. If the system was what he claimed for it, it must be a very good thing, and by good he meant commercially good—there must be a saving in it, and Dr. Eveleigh, and those associated with him, would expect to reap the advantage of the invention. The agreement made with the two or three companies who had determined to try it was this—in one case they were to pay so much per 1000 feet; in another, as suggested by Mr. Stephenson, so much per retort. He did not think the Patent Gas Company would wish for anything like a heavy royalty in the matter. He had always advised them to take a low rather than a high royalty, and he had no doubt whatever satisfactory arrangements would, in all cases, be effected. With regard to the cost of the apparatus, the company were now putting up for the South Metropolitan and Crystal Palace District Gas Companies two sets at cost price. In the one case the cost was not to exceed, including many things that would do very well for more retorts, £600 for ten retorts, and in the other, £1000 for twenty retorts. As he stated in his paper, he believed the additional cost of apparatus, including the oil stills, would amount to £25 per retort in the first instance. In conclusion, he begged to thank the members for the kind manner in which they had listened to his observations.

The PRESIDENT said, as the representative of the members of the association on that occasion, he thought he might fairly thank Mr. Mellor for the candid manner in which he had entered into the description of the new process of gas manufacture. Mr. Mellor, coming forward as he did to meet a body of gas managers, no doubt expected that the principles and details of the invention would be critically viewed, and he was sure that he would not feel aggrieved by the spirit in which these had been commented on. It behoved those who occupied the position held by members of the association not to be biassed against any professed new discovery, but to look at it carefully and judge of its merits on scientific and commercial grounds. The gist of Dr. Eveleigh's patent process appeared to be that he volatilized more carbon than in the ordinary mode of gas-making, and he claimed that by mixing the two gases so made he gained a considerable increase of illuminating power. But after having heard all that Mr. Mellor had to say on the subject, he (the president) must express his opinion that they had not yet got what they required to determine the point—viz., what was the true commercial value of the process. Mr. Mellor, he was sure, had given them every information as far as he was able, but no doubt he was restricted in some respects, and had acted wisely in not going into this part of the subject. His (the president's) only fear was that the two gentlemen referred to, who were chemists, would at the close of their investigations only report upon the matter chemically, and that the desired knowledge of commercial results would not be acquired from their researches. With reference to the permanence of the gas made by Dr. Eveleigh's process, Mr. Mellor had tested it as far as he could, but, as a practical gas manager, he (the president) would much have preferred a statement that Mr. Mellor had ascertained by the station-meter for a given time that the make of gas had been so much, and that during that period the consumers meters had registered so much, and the public lamps had consumed so much. By deducting the one from the other he would have been much better able to judge of the permanency of the gas than by the experiments which had been made. In company with several gentlemen, he (the president) had been to Barnet to see the process in operation, and was received by Mr. Mellor with great kindness, and supplied with all the information in his power. The process seemed very plain, and the result satisfactory; but after all, as commercial men, they must look at the balance-sheet, and unless good returns in that direction could be exhi-

bited, it was of little importance, comparatively, how beautiful or ingenious the arrangement might be. At present they had not obtained all the data necessary for demonstrating that matter. It was evident, however, that 20-candle gas could be produced from cannel coal, and this was an important step in the right direction; for even if the thing went no farther, he agreed with Mr. Stephenson in thinking the invention might be satisfactorily utilized in raising the standard of ordinary common gas as required by Act of Parliament.

(To be continued.)

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN MAY, 1872:—

MAY, 1872.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	May, 1871. 0°	May, 1872. 0°	May, 1871. 0°	May, 1872. 0°	0°
Distilled Water . . .					
†West Middlesex water .	16·94	17·68	0·70	0·68	·001
Grand Junction water .	17·08	17·84	0·80	0·70	·001

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

† During the month the water of the West Middlesex Company has been invariably bright and colourless, and as compared with the previous months of the present year, there has been a marked reduction in the quantity of solid matter contained in it. The water of the Grand Junction Company has also been very bright and clear, and in all other respects satisfactory.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN MAY, 1872:—

MAY, 1872.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . . .	17·18	17·80	16·70	28·45	9·86	28·75	0·58	None.
Chartered Company's common gas	17·29	17·80	16·80	38·95	16·69	27·34	0·70	None.
Chartered Company's cannel gas	23·68	25·40	22·80	32·51	15·61	25·92	0·53	None.

Mean of daily readings of barometer . . . . 29·76
" " " thermometer . . . 64·77

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

Throughout the month all the three gases consumed in the parish have maintained a very high illuminating power. The gas of the Imperial Company has shown a mean light equal to rather more than 17 candles, and ranged between 17·80 and 16·70 candles. The Chartered common gas gave a mean light equal to 17·29 candles, and ranged between 17·80 and 16·80 candles. The mean light of the cannel gas was equal to rather more than 23½ candles, and ranged between 25·40 and 22·80 candles. I am happy to observe some little reduction in the amount of sulphur impurity in all the gases. The cannel gas showed the least, which amounted to a mean quantity of rather less than 26 grains in 100 cubic feet of gas. The quantity of ammonia found in the three gases slightly exceeded half a grain. On no occasion was sulphuretted hydrogen detected in either of the gases by the ordinary tests. The pressure of all was satisfactory. The above results were obtained from the gas manufactured by the Imperial Company, at their Fulham Works, and from the Chartered Company's gas manufactured at their works, Horseferry Road, Westminster.

THE GAS QUESTION AT DEAL.—The correspondent of a local paper says—"The town presents a woful appearance, none of the public gas-lamps being lighted. Many of the ratepayers question the policy of the commissioners order, which is considered to be in contravention of the Town Act, which orders the making of rates for the watching, lighting, and paving the town. The finances are in a sad state, owing to the over-zeal of the authorities."

THE PROPOSED PURCHASE OF THE RYDE GAS-WORKS.—It is generally stated throughout the town that a letter has been received from the Local Government Board in London, refusing their sanction to the extension of borrowing powers. Should this be the fact, which is generally believed, then the gas-works question is virtually settled, and it will simply resolve itself into a question of payment of expenses, and although our Town Council have erred in judgment, it was done with the best intentions, therefore we think the town ought to bear the costs.—*Hampshire Advertiser.*

GAS SUPPLY OF HULL.—Mr. Baynes reports that the general character of the gas sent into the Sculcoates and Myton district by the British Gas Company, during May, was satisfactory, the mean of 18 experiments of 10 observations each for illuminating power, showing an intensity of light exceeding 14½ candles. Neither sulphuretted hydrogen nor free ammonia was present to the ordinary tests. The results for the month are:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles. . .	15·10	14·36	14·69
Grains of sulphur per 100 feet.	27·10	25·70	26·40
Grains of ammonia per 100 feet	—	—	0·80

Mean barometer and temperature in experiment room:—
Bar. . . . . 29·97. .. Temp. . . . . 59.

DUNDEE GAS REVENUE AND EXPENDITURE.—Although the high price of coal makes it unwise to further reduce the price of gas, the accounts of the Dundee Gas Commissioners for the year ending the 30th of April, 1872, must be considered very satisfactory, as they show a surplus revenue of £2710, in addition to £2000 carried to the sinking-fund. The whole revenue for the year was £43,873, of which £37,553 was received for the gas supplied to the consumers, £1945 for meter-rents, £1153 for coke, and £3220 for chemical products. The principal items of expenditure were £22,265 for coals and firemen's wages; £8662 for annuities to shareholders in the gas companies; £1752 for salaries, including cost of collecting revenue; £1600 for interest on mortgages; £1439 for assessments and taxes; and £1070 for meters. As showing the great increase in the price of coal, we observe in the list of contracts that the same quality of coal, which were supplied in the spring of last year at 18s. 3d. per ton are now charged 26s. 3d.; and that cannel coal which was last year charged 26s. is now charged 33s. 3d.; and so on in proportion for all other qualities. This great increase in price may be expected to tell seriously on the accounts for the present year, and it will be the best evidence of the good management of the gas commission if the commissioners are able to go through the year without advancing the charge for gas.—*Dundee Advertiser.*

COMPLAINTS AS TO INCREASED COST OF GAS AT ABERDEEN.—Bailie Urquhart brought this subject before the last meeting of the Town Council. He stated that as complaints had been made that consumers accounts were larger for the past half year than for the corresponding six months in 1871, although the price per 1000 feet had been reduced, he had asked the chief clerk, Mr. Cran, to make comparisons on a number of the accounts. A few hundreds had accordingly been taken consecutively in streets—no exceptions being made except where there had been a change of tenants—and the result was to show that there had been an increase of 2 per cent. in the consumption of those whose houses had been compared. The reduction in price, however, had been about 8½ per cent., so tha there was over all a less sum to pay than last half year. In regard to the increased consumption, it had been suggested to him that it was partly due to the fact that during the past six months there had been a greater number of dark and rainy days than usual, and consequently more hours during which it had been necessary to burn gas; while it had also to be remembered that the lights were not likely to be reduced when the price was lower.

GAS SUPPLY OF BATLEY AND DEWSBURY.—At a meeting of the Dewsbury Council held on Tuesday, June 4, and over which Mr. Mark Newsome, the mayor, presided, the question of the joint purchase with Batley of the works and plant of the Dewsbury and Batley Gas Company was briefly discussed and approved of. It is intended to divide the works after purchase, each corporation having gas-house, &c., for its own district. An ordinary meeting of the Batley Town Council was held on Thursday, the 6th inst., in the council-room at the town-hall, the mayor (Mr. R. D. Keighley) in the chair, when resolutions passed by the Gas Committee, relative to the joint purchase by the Batley and Dewsbury Corporations, of the works and plant of the Dewsbury and Batley Gas Company, were confirmed, as was also a proposition for supplying the Ossett Local Board with water from the Batley Corporation Water-Works when completed.

GAS SUPPLY OF BURY, LANCASHIRE.—At the meeting of the Improvement Commissioners on the 5th inst., the following report on the gas supply was presented:—"Gas sold for the year ending May 16, 1871, 115,016,100; ditto, up to May 16, 1872, 122,146,800: increase, 7,130,700, or 6 per cent. Gas sold from the 24th of March to May 16, 1871, 10,935,300, ditto from 24th March to May 16, 1872, 11,971,400; increase, 1,036,100, or 9 per cent. Gas sold for the month ending May 16, 1871, 6,656,900; ditto for the month ending May 16, 1872, 7,350,600; increase 693,800, or 10½ per cent. Cash received for month ending May, 1872: Gas and meter rents, £5518 16s. 7d.; materials, £604 9s. 2d.; total, £6123 5s. 9d. Amount paid, £1913 13s. 10d. Gas and meter rents (less share of profits) including arrears due 25th of March, 1872, £8318 2s. 10d.; cash received, £6540 5s. 5d.; discount allowed, £1036 3s. 9d.; total, £7576 9s. 2d.; arrears this day, £741 13s. 8d. Balance in bank, general account, £325 6s. 8d.; ditto, sinking-fund account, £7278 12s.; total, £7603 18s. 8d.

THE HARROW GASLIGHT AND COKE COMPANY, LIMITED.—A company has just been registered, with a capital of £30,000, in 3000 shares of £10 each: The object is to acquire by purchase the premises known as the "Harrow Gas-Works," situate at Harrow, Middlesex, at present the property of John Chapman, Esq. The subscribers are Messrs. Jas. Glaisher, F.R.S., No. 1, Dartmouth Place, Blackheath, 20 shares; Charles Horsley, No. 174, Highbury New Park, Civil Engineer, 20 shares; Thomas C. Hudson, Harrow, Builder, 20 shares; Henry T. Miles, No. 17, Piccadilly, 10 shares; S. Gainthorp, Tottenham, 20 shares; J. M. Weightman, Basinghall Street, Solicitor, 10 shares; Alfred Penny, Wharf Road, N., Engineer, 40 shares. The registered office of the company is now situated at Suffolk House, Byron Hill Road, Harrow.

TORQUAY GAS COMPANY.—The shareholders of this company held their annual meeting on Monday, the 10th inst. There was no report—the directors simply recommending the declaration of a dividend of 10 per cent. on the old capital, and 7 per cent. on the new, and likewise to consider the question of raising the price of gas, in consequence of the increased cost of coal, labour, and materials. The accounts were read, showing a very handsome balance with £1800 as a reserve-fund. The accounts were adopted, and a dividend as recommended declared. Mr. C. N. Luxmore (director) and Mr. Daw (auditor) were re-elected. A brief discussion took place on the proposed increase in price, and it having been shown that the dividend could not be continued at the present rates unless the price was raised, it was resolved to advance it from 4s. 6d. to 5s. per 1000 cubic feet on and after Midsummer next.

MIDDLESBOROUGH CORPORATION GAS-WORKS.—An ordinary monthly meeting of the Middlesborough Town Council was held on the 11th inst.—Mr. T. Vaughan (mayor) presided. The Gas Committee reported that they had arranged for a supply of coals at 12s. 10d. and 13s. 10d. per ton; the last contract was at 8s. 4d. per ton. A letter from the gas manager, resigning his appointment, gave rise to much discussion. The letter was as follows:—"Middlesborough, May 28. Gentlemen,—I beg respectfully to tender my resignation as your manager. The persecutions which I have endured during the past six months from one member of the committee, and the more recent unwarrantable attack on my character by Mr. Dunning (ex gas manager), evidence very clearly that it would be unjust to myself to remain in a position in which I am evidently marked for attack, and daily called upon to protect myself from slander. I thank you as a committee heartily for the kind manner in which you have supported me, and given me the protection of a careful and patient investigation of the groundless charges made against me, but I cannot see my way to continue, subject to a repetition of the past.—I am, &c., A. C. FRAZER." At a meeting of the Gas Committee, on May 27, the following resolution was entered on the minutes:—"Mr. Dunning's charges against Mr. Frazer, the gas manager, were considered; ordered, with one dissentient, that this committee wishes to express its very strong condemnation of the conduct of Mr. Dunning in making a direct accusation of dishonesty against the gas manager, whereas when opportunity has been afforded him to prove such charges, he has utterly failed to do so." Mr. Dunning protested against this minute remaining upon the books of the council, arguing that his statement respecting the manager was made under reserve at a private committee meeting. This was denied by all other members of the committee. Mr. Dunning then added that he still adhered to his statement respecting the gas manager receiving 10 per cent. commission upon orders for gas-meters supplied by Messrs. Glover and Co. The corporation had a letter from the firm, which said that they did not allow commission to "companies," but Mr. Dunning adhered to his statement respecting "managers," and produced a list of prices issued by the firm, wherein the 10 per cent. discount was mentioned. After a lively discussion, in which some private letters were read, the minutes of the committee were confirmed. At the close of the ordinary business, Alderman Wilson moved, and the mayor seconded, a resolution acknowledging the efficient services of Mr. A. C. Frazer to the town, and declaring that he left without a blemish upon his character. This was adopted without any dissent.

THE PRICE OF GAS AT HEYWOOD.—At a meeting of the local board, on the 6th inst., it was resolved, after some discussion—"That all gas consumers within and without the limits of the board's jurisdiction have returned 1s. 3d. for every 1000 cubic feet of gas consumed if they paid their rates within a month after the rate was laid, and that the consumption of street lamps be charged for the same as other consumers, and that they be allowed the same discount, the resolution to come into operation in September next." At the meeting of the board on the following Wednesday it was resolved, on the motion of the chairman, that Mr. Harwood's resolution, passed at the last meeting, relating to the reduction of the price of gas be rescinded, and that no further action be taken to disturb the price of gas.

THE GRYPE WATER SUPPLY.—The waters of this new system were introduced into Greenock on Saturday, June 1st. The works cost £165,000, and were commenced several years ago.

SEWAGE FARMING AT TUNBRIDGE WELLS.

The following is a copy of the profit and loss account of the town sewage farms, as presented by the Sewage Outfalls Committee, at the monthly meeting of the Tunbridge Wells Local Board, on Wednesday, June 5:—

NORTHERN SEWAGE FARM.

Profit and Loss Account for the Year ending March 25, 1872.

Receipts.

To Sale of 39 bullocks	£889	3	6
,, 2 horses	40	0	0
,, Rye grass	304	8	0
,, Hay	99	2	0
,, Wheat and oats	139	18	0
,, Manure	51	3	0
,, Mangolds	1	4	0
,, Beans and Cabbages	10	2	3
,, Hop-pole faggots	31	6	6
Cattle and sheep keep	15	8	6
Horse labour	54	10	0
Garden, cottage rents, &c.	53	0	6
			£1689 6 3

Outstanding Accounts.

W. Graves, quarter's rent			10 0 0

Austen's Valuation.

4 horses	106	10	0
27 bullocks	434	0	0
Manures	60	17	6
Hay, straw, and mangold	228	0	0
Corn, &c.	49	12	0
Implements of husbandry	303	8	0
Cultivation and young seeds	92	1	0
Labour applying sewage	31	4	0
			1305 12 6
			£3004 18 9

Expenditure.

By Valuation on the 25th of March, 1872, brought forward					£915 6 6
Purchase of 50 cattle	£709	10	0		
,, 1 horse	23	2	0		
,, Farm implements	26	3	11		
,, Seeds	27	17	2		
,, Provender	286	5	10		
,, Straw	47	15	4		
				1120	14 3
Farm labour	443	5	4		
Bailiff's wages	75	0	0		
Rates and taxes	61	14	2		
Miscellaneous expenses	99	11	6		
Outstanding accounts	60	14	10		
				740	5 10
Balance				227	12 0
				£3004	18 9

SOUTHERN SEWAGE FARM.

Receipts.

To Sale of 2 bullocks	£36	0	0
,, Rye grass	143	5	7
,, Hay	342	0	0
,, Wheat and oats	104	7	0
,, Manure	11	8	0
,, Mangold	21	5	2
,, Cabbages, &c.	15	12	0
,, Sheep keep	19	16	9
,, Hop-pole faggots	9	17	0
,, Hops	635	7	9
Cottage rents	22	8	4
			£1352 7 7

Austen's Valuation.

5 horses	171	10	0
49 beasts	923	10	0
Implements of husbandry	353	3	6
Cultivations and young hops	159	14	0
Hop-poles, digging, dressing, &c.	335	10	0
Manures	64	12	0
Hay	140	0	0
Young seeds	14	10	0
Sheep keep	46	8	0
Labour applying sewage	27	6	0
			2236 3 6
			£3588 11 1

Expenditure.

By Valuation on the 25th of March, 1871, brought forward					£890 5 6
Purchase of 51 cattle	£649	5	8		
,, 1 horse	10	0	0		
,, Farm implements	96	6	4		
,, Provender	136	16	2		
,, Seeds	52	6	10		
,, Straw	10	16	4		
Cattle keep	14	0	0		
				969	10 8
Farm labour	689	17	7		
Ditto (hops)	157	11	8		
Bailiff's wages	95	10	1		
Rates and taxes	108	11	1		
Miscellaneous expenses	98	7	1		
Outstanding accounts	88	4	9		
				1209	2 3
Balance				519	12 8
				£3588	11 1

NINE HOURS MOVEMENT AMONG GAS-TUBE MAKERS.—On Tuesday, June 11, a meeting of the men employed at Skidmore's gas-tube works, Netherton, Dudley, was held near the works. From the statements made it appeared that some months ago the men gave notice for the nine hours system, but were induced to withdraw it upon a promise that their case should be considered. After waiting two months, the men were informed by the manager that two hours on Monday would be allowed, and that the men were to work from seven until five. The men refused to accept these terms, and the manager then withdrew the granted two hours. The men intimated their intention of going to work on the following Monday, and work out a proper notice previous to leaving. On the Monday morning the manager posted himself at the works, and refused to allow the men who came at six to commence until seven. Those who commenced at the latter hour would be understood to accept the terms, and those who did not might consider themselves under notice. At the meeting it was unanimously determined to keep out until the nine hours system is conceded. An adjourned meeting was held on the 12th at Dudley Wood, when it was resolved to continue on strike until the nine hours system was conceded. Deputations were also appointed to visit the tube works in different parts of the country, with the view of obtaining sympathy and support.

SUFFOCATION BY GAS IN A BED-ROOM.—A sad occurrence befell the family of Mr. Steward, postman, at Mutley, near Plymouth, on Friday, June 7. His wife, having been recently confined, was in her bed-room with an infant and the nurse. The latter, in warming the food for the child, must unconsciously have deranged a joint of the gas-stove, thus permitting an escape of gas. When Mr. Steward visited the bed-room, about seven o'clock, he was horrified at finding the three inmates apparently lifeless. All efforts to restore animation to his wife were futile, but the nurse and infant are still living, although little expectation is entertained of their recovery.

DISPUTED GAS BILL AT LEEDS.—On the 3rd inst., the adjourned case against Mrs. Russell, Glasshouse Street, Hunslet Road, Leeds, for non-payment of last half yetar's gas bill, came before the magistrates (Messrs. Ellershaw, Irwin, and Middleon), in the second Borough Court. A certificate was put in from the tester appointed by the corporation, to the effect that he had examined Mrs. Russell's meter, and found it quite accurate. Mr. Wade St. John, who appeared for the defendant, stated that his client had lived in the present house over ten years. Under the old company her half year's gas bill never exceeded 14s., but the first half year after the corporation took to the gas-works, though she still had the same number of lights, the bill amounted to no less a sum than £1 9s. 10d. Mr. Lupton, the secretary, denied the accuracy of this statement, and proved that this increase was in the half year before the corporation took the works, and followed immediately after the putting in of the new (present) meter. Mr. Wade St. John could not withstand this evidence, and the bench made an order for the payment of the bill.

SERIOUS GAS EXPLOSION AT TONBRIDGE.—On Wednesday, June 5, there was a very serious explosion of gas in the dining-room of Chatham House, Hadlow Road, the residence of Mr. R. W. Annison, grocer. It appears that the telescope chandelier had emptied itself of the water necessary for retaining the gas, and consequently the gas escaped, as it had not been turned off at the meter. The gas in escaping made a kind of gurgling noise which was heard during the night, but it was supposed to be water dripping. Next morning it was discovered that the water was not running, and Mrs. Annison perceived a strong smell of gas in the dining-room. She got on a chair and struck a light to ascertain where the leakage was, when immediately the gas in the room, which must have been dense, exploded, forcing the panes of a thick plate-glass window into the road, and shivering them into atoms, blowing the door off its hinges into the passage, wrenching off a piece of the panelling, setting the curtains on fire, singeing the carpet, and damaging a lot of valuable furniture. Mrs. Annison was thrown off the chair, and received very serious injuries to her face, neck, and arms; and the collar she was wearing round her neck was set on fire.

LIABILITY OF A NEW TENANT FOR ARREARS OF GAS-RENTAL.—At the Brighton County Court, on the 6th inst., the gas company sued a person named Thomas on a claim of £3 for gas supplied. The defence was that there had been a change in the tenancy, so that only a portion of the amount was due from the party now sued. It appeared that the premises were transferred from father to son, so that the business was carried on in the same surname. The judge (Mr. Furner) said that unless a distinct notice of the change of tenancy was given to the company the father would still be liable. The defendant failed to prove to the satisfaction of the court that such a notice had been given, and his honour consequently found a verdict for the plaintiffs.

CURIOUS COMPENSATION CASE.—The case of *Holt v. The Gaslight and Coke Company* has just been argued in the Court of Queen's Bench. In this case the plaintiff is colonel of the Tower Hamlets Volunteer Rifle Brigade, which had a shooting range at Plaistow, Essex. The brigade had in the first instance taken leases of two adjoining meadows, which gave them a range of 800 yards. At the end of one of these meadows they had at a considerable expense built two butts, but as the bullets which missed the butts went into the next meadow, they had agreed with the occupier of that meadow to pay him a yearly sum as compensation for any cattle that might be shot. The bullets, however, occasionally went beyond this meadow to some land belonging to Mr. Raphael, who stopped their shooting by an injunction in the Court of Chancery. Before this, however, the brigade took from Mr. Raphael a lease of his land. After this lease the gas company, under the powers of their Act, took part of the land leased, the effect of which was to destroy the shooting range. The brigade claimed compensation not only for the value of the land taken by the company, but also for the loss to the men of the opportunity of using the shooting range as well as for the loss of the rents occasionally received from other rifle corps for shooting on certain days at the range, founding their claim upon what they contended was the true construction of the 49th and 63rd sections of the Lands Clauses Act. The case was tried before the Under Sheriff of Essex and a special jury, who gave the brigade £300 for the land, and £2500 for the destruction of the range. A rule for a *certiorari* to bring the inquisition up to be quashed having been obtained by Mr. Hawkins, Q.C., it was argued by that gentleman and Mr. Philbrick at considerable length on behalf of the company; and by Mr. Horace Lloyd, Q.C., and Mr. R. E. Turner, for the brigade. The court held that the circumstances constituted damage by severance, or, at all events, an injurious affecting of the land, although the piece of land leased by Mr. Raphael did not actually join on to the other lands, and therefore that the brigade was entitled to both sums.

FAILURE OF A GAS-RATE AT OGLEY HAY.—At the Shenstone Petty Sessions, on Wednesday last, Robert Tuckley, Thomas Smith, George Page, William Salt, and Joseph Turner, residents in Ogley Hay, were summoned at the instance of the churchwardens and overseers of Ogley Hay, under the Watching and Lighting Act, 3rd and 4th William IV., c. 90, for non-payment of a gas-rate of 8d in the pound. Mr. Glover appeared in support of the summonses, and Mr. Dale (from the offices of Messrs. Duignan, Lewis, and Lewis) for the defendants. It was shown that the Act in question enables a parish, or part of a parish, to provide for the lighting and watching of such locality; but there must be a public meeting of the inhabitants called, at the request of not less than three ratepayers, and the adoption of the Act must be carried by a majority of two-thirds of the persons present at such meeting. At the meeting, the district, if only part of a parish, must be defined, and inspectors appointed for the purpose of carrying out the Act, with power to raise a certain sum during the

year, and to issue an order to the churchwardens and overseers to make a rate, upon the basis of the poor-rate, for the purpose of raising the sum required. The Act further requires that where the Act is to be adopted for part of a parish, the inhabitants of that part shall be called together in public meeting by the persons signing the requisition, and shall decide whether the Act shall be adopted in that part of the parish which they represent, and with which alone they are competent to deal. In this case, the application, which was signed by four persons, mentioned certain parts of the Chester and Lichfield roads as the district, but the district decided upon at the public meeting took in an intermediate road called Church Hill. Upon this ground, the magistrates held that the district had not been properly formed, and the summonses were dismissed.

The Rise in the Price of Coal.—The miners in the Leeds district still preserve the attitude they adopted at the commencement of the week. They refuse to return to work until the masters accede to their application for the 22½ per cent. increase. This being still refused, the state of affairs remains in the same position as at the beginning of the week. The men complain of what they designate a breach of faith on the part of the Farnley Iron-Works Company with regard to the overture to allow the men to work out the present week at the rate of 22½ per cent., and then give them the advance generally given by the trade in the district. With regard to the statement we published on the authority of the men that the trustees of Messrs. R. and W. Garside had offered the colliers an advance of 18 per cent., we have received a communication from the firm to the effect that the only foundation for the statement is that their underground steward having reported that he had reason to believe that the men would accept 17½ per cent., was verbally instructed to inform the men that if they were willing to accept that amount they were to make an offer to do so in writing, and it would be considered. On the 7th inst. a meeting of the Low Moor Company's colliers at Beeston was held at the Old Punch Bowl Inn, Beeston, to receive the report of the deputation appointed the previous evening to wait upon Mr. Tempest for an answer from those he represented. The deputation reported that Mr. Tempest had told them the company would give them an advance equivalent to 10 per cent.; but whatever the Farnley Company gave them, or the Bowling Company, they would grant the same rise. It was stated that the Farnley Company's men were going in at an advance of 10 per cent., and general indignation was expressed at this result, especially as it was stated by the chairman of the meeting that Mr. Harding's colliers at Beeston had been offered an advance of 15 per cent., but they would not take it. Mr. Joseph Walker and Mr. Thorp attended from the Leeds committee, and strongly urged upon the meeting the necessity of being united, and pointedly told them that if they went in with the Leeds miners, to be assisted by the colliers of the Methley district, they must go in resolutely, and be prepared to stick to one another. Ultimately it was agreed pretty unanimously to send word to Mr. Tempest that they were unaltered in their demand, or that at any rate they could give him no further information except after consultation with the Leeds managing committee. It was agreed that Mr. Harding's men should be joined with the Low Moor Company's men, and a committee was formed to confer with the general committee at Leeds. On the 7th inst. also a large meeting of coalowners was held at the Bull Hotel, Wakefield. A resolution was come to confirming the decision of the meeting of owners held at Leeds on Tuesday—viz., to give their men an advance, varying according to circumstances, but in no case exceeding 15 per cent. Most of the colliery owners having reported that their men had continued working at these advances, it was thought that the strike was virtually at an end.—*Leeds Mercury.*

Exhausting Machinery.—Messrs. Gwynne and Co., Engineers, Essex Street Works, Strand, London, W.C., have at the present moment in hand a large number of orders for their patent "Gwynne and Beale's Improved Gas Exhausters," which have given such very satisfactory results in working. They are about completing two of the largest gas exhausters in the world, with the engines, &c., attached, for the Imperial Gas Company. Several very important improvements have been introduced in their construction, and the consumption of fuel for working these exhausters will be considerably reduced. These large exhausters will be on view at Messrs. Gwynne's works at the end of the present month; and gas managers can inspect them on presenting their card at the works, Harrow.

Proposed Purchase of the Sunderland and South Shields Water-Works.—At a meeting of the South Shields Town Council, held on the 5th inst., a deputation was appointed to confer with a deputation of the Sunderland Corporation to consider the advisability of purchasing the works of the Sunderland and South Shields Water Company.

Bristol Water-Works Company.—At an extraordinary general meeting of this company on Tuesday, June 4, it was resolved to raise additional capital to the amount of £160,000, under the Act of 1872. The amount will be raised in £20 shares, entitled to participate in ordinary dividends. They will be offered to the shareholders in proportion to one for every original share, with power to the shareholder to renunciate in favour of any nominee.

Water Supply of Kettering.—The water-works are progressing in a very satisfactory manner, and active steps are being taken to send the abundant supply of water which has been found near "Stone Moses," at Markton (a little over a mile from the town), at a pressure sufficient to force it to the top of the highest house, and also to supply the numerous steam-engines with a quality of water which will not injure the boilers. The company have obtained from the Duke of Buccleuch land to erect a pumping-station, which will consist of an underground reservoir, engine-house to contain an engine with two boilers, manager's house, and every other arrangement for supplying a population of 10,000 persons with an adequate quantity of good water at a moderate cost. The supplying and laying down the pipes, &c., through every street in the town has been contracted for by Messrs. John Aird and Son, of London, for about £5000. It is hoped that before very long Kettering will be in possession of all the advantages resulting from a good water supply.

The Leamington Sewerage Works.—At the fortnightly meeting of the local board, on Tuesday, April 4, Mr. J. Bowen in the chair, the clerk submitted a statement of the entire cost of the new sewerage works, including the working expenses from April, 1870, to March 25, 1872. When the local authorities at Milverton and Lillington joined this board in the proposal to adopt a scheme of irrigation for the three parishes, it was mutually agreed that the value of the works then existing, and which belonged to this board, should be set down at £8500, and added to the loans necessary to complete the scheme. The outlay had been as follows:—Messrs. Roberts, Ironfounders, West Bromwich, for supplying cast-iron sewage main, £3822 19s. 8d.; Messrs. Gascoyne and Son, Builders, Leamington, for laying the same, £1136 2s. 8d.; Mr. W. Green, Builder, Leamington, the contractor for the engine-house and other necessary buildings, £4425; Messrs. Clayton, Engineers, Preston, contract for engines, £4000; Lampitt and Sons, for penstocks, £60; compensation, £197; total, £13,841 2s. 4d., which, with the £8500, estimated value of previous works, gives a total of £21,841 2s. 4d. The working expenses from April, 1870, to March, 1872, amounted to £800 18s. 3d.; the grand total being £22,641 15s. 7d. up to the present time. The annual payments in instalments and interest for 30 years, being the period fixed for clearing off the loans, will be £1419 13s. 5d., of which sum Leamington will contribute £1205 16s. 4d.; Milverton, £138 16s. 5d.; and Lillington, £75 0s. 8d. The annual working expenses are calculated at £813 8s., the proportions for the several towns being—Leamington, £689 0s. 10d.; Milverton, £78 8s. 5d.; and Lillington, £40 9s.

Polluting Streams.—The case of *Broughton v. The Crewe Local Board*, one of the numerous cases that have recently been before the Court of Chancery in relation to the pollution of streams by the sewage of great towns, was before Vice-Chancellor Bacon on Wednesday last. The bill was filed in March, 1870, to restrain the Crewe Local Board from discharging sewage into the Coppenhall Brook so as to cause a nuisance. One of the plaintiffs is the occupier of Wistaston Hall, and the other plaintiff is tenant for life in remainder of the Wistaston estate, a property situate on the banks of the brook. An injunction was granted at the hearing of the cause, which the judge directed was not to be put in force till the 5th of May last, two years being allowed the defendants to make the necessary works to divert the sewage. The defendants have acquired property in the neighbourhood of Crewe to be used as a sewage farm, but have not completed the works necessary to discharge the sewage on the farm. This was an application by motion on the part of the defendants for further time, on the ground that the stiff nature of the soil (Crewe being situate in the middle of a clay country) and the wet season have prevented greater despatch in the construction of the works, and that they experienced difficulties in the original acquisition of their farm. The Vice-Chancellor was of opinion that the defendants had not shown any good reasons for the delay which had occurred. They could have acquired the property sooner just as well as they did afterwards, and the difficulty of working the soil was merely an occasion of extra expense by putting on more hands; they could cut through heavy soil as well as light; the difference was merely one of expense. The defendants had shown that supineness and slowness which were too common in bodies of their nature, and considering the frequency of cases of this kind, and the frequent applications to the court that had been necessary to protect the public from like nuisances, it was necessary to show that the order of the court could not be disregarded. The defendants had not shown any reason for delaying process, but it might be in their power to do so. He therefore directed the motion to stand over till next motion day on the understanding that it would be dismissed unless the defendants either provided some scheme to abate the nuisance temporarily, or proposed the appointment of an engineer to examine their works, and undertook to act under his directions.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1656.—William Robert Lake, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in metallic packing for making steam, air, gas, or water tight joints*" A communication. May 31, 1872.

1663.—Edward Richard Hollands, of 37, Newington Green, in the co. of Middlesex, William Maker, of 8, Milton Road, South Hornsey, in the co. of Middlesex, and Charles Henry Jefferies, of 8, Milton Road, South Hornsey, in the co. of Middlesex, for "*Improvements in meters for measuring water and other fluids.*" June 1, 1872.

1671.—Joseph Brown, of Burnley, in the co. of Lancaster, gas-meter maker, for "*Improvements in the construction of gas-meters.*" June 3, 1872.

1673.—Stephen Thomas Wentworth, of Queen Street, Cheapside, in the City of London, gas-fitter, for "*Improvements in burners for consuming gas and air combined.*" June 3, 1872.

1679.—Charles Weightman Harrison and Alfred Horatio Harrison, both of High Holborn, in the co. of Middlesex, engineers, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" June 3, 1872.

1682.—Antoine Dugdale, of 174, Rue de Courcelles, Ternes, in the city of Paris, France, engineer, Jules Mingrat, of 25, Rue Neuve, in the city of Brussels, Belgium, engineer, and Achille Vansteenkiste, of 21, Rue Rogier, in the city of Brussels, Belgium, dyer, for "*Improvements in the manufacture of steam-cocks, water-cocks, and gas-cocks.*" June 4, 1872.

1683.—Thomas Hack, of the West Middlesex Water-Works, Hammersmith, in the co. of Middlesex, civil engineer, for "*Improvements in pipe-connexions.*" June 4, 1872.

1687.—Robert Carey, of 5, Radcliffe Villas, Shakespeare Road, Brixton, in the co. of Surrey, for "*Improvements in rotary pumps, applicable also as fluid-meters.*" June 4, 1872.

1707.—Daniel Vincent, of Erith, in the co. of Kent, manager of gas-works, for "*Improvements in apparatus for distributing liquid, particularly applicable to gas-scrubbers.*" June 5, 1872.

1708.—Charles Weightman Harrison and Alfred Horatio Harrison, both of High Holborn, in the co. of Middlesex, engineers, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" June 5, 1872.

1720.—Paul Charpentier, of 17, Rue Vintimille, Paris, in the republic of France, civil engineer, for "*Improvements in apparatus for heating by gas.*" June 7, 1872.

1746.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in steam-pumps.*" A communication. June 10, 1872.

1747.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*An improved fastening for the lids or covers of gas-retorts.*" A communication. June 10, 1872.

1750.—Charles John Smith, of Northampton, in the co. of Northampton, superintendent of fire brigade, for "*An improved coupling for hose and other pipes.*" June 10, 1872.

1762.—Charles Frederick Hengst, of Fulham, in the co. of Middlesex, engineer, and John Bell Muschamp, of Kensington, in the co. of Middlesex, gentleman, for "*Improvements in the manufacture of gas, and in the apparatus employed therein.*" June 11, 1872.

1768.—George Anderson, of Dalmeny Oil-Works, in the co. of Linlithgow, and James Buchanan, of the same place, for "*Improvements in apparatus for drawing the charge from retorts employed in making gas or oil.*" June 12, 1872.

1771.—Hugh Shanks, of South Queensferry, in the co. of Linlithgow, N.B., for "*Improvements in drawing retorts, and in the means employed therefor.*" June 12, 1872.

GRANTS OF PROVISIONAL PROTECTION.

1663.—Edward Richard Hollands, of 37, Newington Green, in the co. of Middlesex, William Maker, of 8, Milton Road, South Hornsey, in the co. of Middlesex, and Charles Henry Jefferies, of 8, Milton Road, South Hornsey, in the co. of Middlesex, for "*Improvements in meters for measuring water and other fluids.*" June 1, 1872.

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1679.—Charles Weightman Harrison and Alfred Horatio Harrison, both of High Holborn, in the co. of Middlesex, engineers, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" June 3, 1872.

1682.—Antoine Dugdale, of 174, Rue de Courcelles, Ternes, in the city of Paris, France, engineer, Jules Mingrat, of 25, Rue Neuve, in the city of Brussels, Belgium, engineer, and Achille Vansteenkiste, of 21, Rue Rogier, in the city of Brussels, Belgium, dyer, for "*Improvements in the manufacture of steam-cocks, water-cocks, and gas-cocks.*" June 4, 1872.

NOTICES TO PROCEED.

245.—Henri Adrien Bonneville, of 18, Rue de la Chaussée d'Antin, Paris, and 6, Piccadilly, in the co. of Middlesex, patent agent, for "*A new and improved process for manufacturing gas for lighting and heating.*" A communication. Jan. 25, 1872.

253.—David Auguste Burr, of Washington city, in the district of Columbia, U.S.A., for "*An improved diaphragm motor and its application in automatically operating valves and levers in low-water detectors, air-compressing machines, supply or discharge pipes, double-acting vacuum-pumps, and other hydraulic or pneumatic machines and engines, by means of an intermittent fluid pressure.*" A communication. Jan. 25, 1872.

416.—Alfred Cresswell, of Birmingham, in the co. of Warwick, builder, for "*Improvements in apparatus for straining or filtering liquids.*" Feb. 9, 1872.

738.—George William Wigner, of 79, Great Tower Street, in the City of London, analytical chemist, and John Williamson, of 25, Warren Street, Stockport, in the co. of Chester, pattern maker, for "*Improved mechanism applicable to dry closets and commodes.*" March 11, 1872.

1420.—Kenneth Henry Cornish, of 22, Market Street, Mayfair, in the co. of Middlesex, for "*Improvements in apparatus used for the manufacture of gas, applicable also to that employed for the distillation of paraffin and other volatile fluids.*" May 10, 1872.

1492.—Thomas Christy the younger and Alexander Bobrownicki, both of 155, Fenchurch Street, in the City of London, for "*Improvements in the treatment of ammoniacal liquors of gas-works, in order to obtain valuable products therefrom.*" May 16, 1872.

Advertisements.

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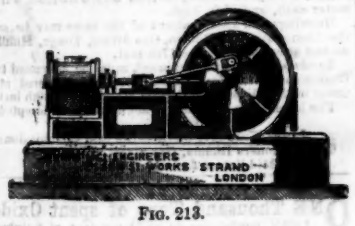

Fig. 213.

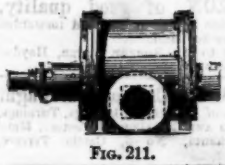

Fig. 211.

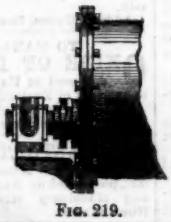

Fig. 219.

GWYNNE & COMPANY,

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REDUCED PRICES AND INCREASED CAPACITY.

Also manufacturers of Improved Hydraulic Regulators, to actuate a steam or gas throttle-valve to suit the make of gas; self-acting bye-pass valves, to move by hand or otherwise; improved stop-valves, with faced flanges, forming the neat adjunct to Exhauster of valve and elbow combined. Exhausters manufactured on the new principal have given the utmost satisfaction, and can be seen working at several large Gas-Works in London. G. & Co. are now engaged in manufacturing the largest Gas-Exhausters in the world, with engines complete.

The Gas-Exhausters may be made with inside or outside bearing, as shown in Figs. 211 and 219.

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Prices and every information upon application to Gwynne and Co. *as above.*

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WANTED, an intelligent young man as Clerk and to collect all water and fitting accounts for the Luton Water Company. Only those who thoroughly understand book-keeping by double entry need apply.
Application, stating age and salary expected, to be sent on or before Wednesday, the 26th of June, addressed to Thos. P. Middleton, Engineer and Manager, Luton, Beds.

WANTED, new or good second-hand, about 80 yards of 6-in. bore SOCKET-PIPES, and about 600 yards of 3-in. bore ditto, both sufficiently strong to bear a pressure equal to 400 ft. head of water; with turned and bored joints preferred; also an Air Vessel for a Pump, about 2 ft. to 2 ft. 6 in. diameter, and from 5 ft. to 7 ft. high, also strong enough to stand the above-named pressure.
Address, stating particulars and price, R. G. W., care of W. Crookwell, Advertising Agent, Liverpool.

WANTED, by the Advertiser, a situation as GAS MANAGER. Can lay on services, take meters, and assist in making gas if required, and do the general work in the works. Six years in last place, with good character.
Address L. C., care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Second-hand Tank suitable for holding ammoniacal liquor, and capable of containing 10,000 gallons.
Apply to D. A. Graham, Manager, Gas-Works, Stalybridge.

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Conducted by Dr. WALLACE,
Consulting and Analytical Chemist, and Gas Examiner for the City of Glasgow.
Glasgow: Chemical Laboratory, 42, Bath Street; Gas Laboratory, 29, Alston Street.

TO GAS COMPANIES.

WANTED, by a thorough good practical MAN, a situation as GENERAL FOREMAN or MANAGER. The best of testimonials can be had, and security given if required. No objection to go abroad.

Address A. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LOUGHBOROUGH GAS-WORKS.

WANTED immediately, a Manager to superintend and conduct the above works. Salary £170 a year. The duties include the making out and collecting of the accounts, and to keep the books of the Company. He will be allowed to take pupils under certain conditions.

Applications, accompanied with testimonials, are to be sent to Mr. W. J. Woolley, of Loughborough, the Secretary of the Company, not later than the 24th day of June inst.

Any information which applicants may require will be furnished to them on application to Mr. P. J. WATES, the present Manager of the works.

Loughborough, June 13, 1872.

THE Advertiser, who has had many years experience, is desirous of obtaining the Management or Lease of a Gas-Work, or would invest capital in the erection of new works.

Address 7, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS AND WATER WORKS ENGINEERS.

THE Advertiser requires an Engineer of experience, fully qualified to advise upon and to prepare plans, specifications, and detail drawings of both Gas and Water Works. He must be a good mechanical engineer, correspondent, and man of business. The best of references will be required.

Salary from £200 to £300 per year, and a permanent situation to a suitable man.

Address A. Z., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

N.B.—A gas engineer only might be entertained.

FOR SALE, a Second-hand Station-Meter, suitable for small works, capable of passing about 4000 cubic feet per hour.

Apply to MANAGER of Gas-Works, Newton Abbot, SOUTH DEVON.

FOR SALE, a Set of Four Purifiers, nearly new, 4 ft. square, with centre-valve, covers, and 6-in. connexions complete. Also Two Cup Valves.

May be seen (or particulars furnished) on application to the MANAGER, Gas-Works, LURGAN.

FOR SALE, a Vertical Condenser, consisting of 12 double rows of 6-in. pipes, with arch pipes, bottom box 12 ft. 6 in. long, tar pipe, and dip bucket, all in good condition.

For price and further particulars, apply to H. CRANMER, Manager, Gas-Works, STRATFORD-UPON-AVON.

FOR SALE.—A 5-H.P. Vertical Steam- ENGINE, and two 5-H.P. CORNISH STEAM-BOILERS, made by the Reading Ironwork Company; an 8-in GOVERNOR, with bye-pass and valves complete, by A. Wright and Co.; and a 20,000 cubic feet per hour EXHAUSTER, by Beale, all in good condition, and at present in use. The Engine and Boilers may be had in September, and the Governor at once.

Particulars as to price, &c., may be obtained of Mr. BAKER, Engineer.

Reading Gas-Works, June 15, 1872.

FOR SALE, at the Tonbridge Gas-Works, three small GASHOLDERS, one 30 ft. by 10 ft., with 5 columns, Tiron girders, carriages, and rollers; also one of 25 ft. by 12 ft., with same number of columns, &c., and one 25 ft. by 14 ft. nearly new, 4 columns, &c. Also 4 Purifiers, 5 ft. by 5 ft. by 4 ft. 9 in., with four 5-in. Bryan Donkin's valves, bends, Ts, &c., some wood sieves; also a piece of round hydraulic main, 6 ft. long.

BOROUGH OF SALFORD GAS COMMITTEE.

FOR SALE, a set of Dry Lime Purifiers about 14 ft. square, with hydraulic centre-valve and all connexions.

Particulars as to price can be had from the MANAGER, at his Office, Gas-Works, Lamb Lane, SALFORD.

June 6, 1872. By order.

FOR SALE, Two Purifiers, 4 ft. square, equal to new, with covers, valves, and 3-in. connexions complete.

One 10-ft. length 12-in. D HYDRAULIC MAIN, with six 3-in. dip, H, and ascension-pipes and side saddle sockets complete.

WANTED to purchase, 400 yards of 3 or 4 in. second-hand MAIN-PIPES in good condition.

Apply to the MANAGER, Gas-Works, Tenterden, Ashford, KENT.

HALIFAX CORPORATION GAS-WORKS.

TO BE SOLD, by Tender, a Gasholder, 70 ft. in diameter by 21 ft. deep, having four sets of guide columns, two columns to each set. The holder is in good working order, and has been thrown out of use this spring in consequence of the erection of a new large gasholder.

Further particulars may be obtained on application to Mr. G. D. Malam, Manager of the Gas-Works, and tenders stating the price offered must be sent to me on or before the 27th of June, endorsed "Tender for Gasholder."

By order, A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, May 22, 1872.

TO TAR DISTILLERS, &c.

THE Directors of the Kingston-upon- Thames Gas Company are prepared to receive TENDERS for the surplus TAR produced at their works at Kingston, from July 1, 1872, to June 30, 1873. Quantity about 80,000 gallons. Tenders to be at per gallon f.o.b. the Contractor's barge.

Further particulars may be obtained from Mr. Watson, Manager, at the works.

Tenders to be sent to Mr. W. A. Fricker, Secretary, Gas Offices, Church Street, Kingston, on or before the 25th of June inst., endorsed "Tender for Tar."

The Company do not pledge themselves to accept the highest or any tender. By order,

W. A. FRICKER, Secretary.

Gas Offices, Kingston, June 1, 1872.

GAS APPARATUS ON SALE.

FOUR PURIFIERS, 8 ft. by 4 ft. each, with Centre Valve, 8-in. Connexions complete.

Also, STATION-METER, capable of passing 3600 feet per hour.

The whole about to be replaced by larger apparatus, are in good repair, and may be seen at work.

Apply to EDWARD RIPLEY, SEN., Bowling, near BRADFORD.

TO TAR DISTILLERS.

THE Directors of the Independent Gas- light and Coke Company are prepared to receive TENDERS for the TAR produced at their works, at Haggerston, for One year, from the 31st of July, 1872.

Tenders to be sent to me, on or before Tuesday, the 16th day of July, endorsed "Tender for Tar."

The Directors do not bind themselves to accept the highest or any tender.—By order,

JAMES B. COULSON, Secretary.

236, Kingsland Road, June 12, 1872.

TO BUILDERS, IRONFOUNDERS, AND CONTRACTORS.

THE Directors of the Wigan Gas Com- pany are desirous of treating for the supply and erection of the following:—

Contract No. 1.—For the erection of new Purifying and Lime Shed, supported by iron columns, &c. Station Meter House, Foundations for Plant, &c.

Contract No. 2.—For the supply and erection of Four Purifiers, 20 feet by 16 feet, with wrought-iron lids and air-valves, five tiers of wood sieves, lifting crabs, valves, and connexions.

Contract No. 3.—One Scrubber on "Mann's" principle, 10 ft. diameter, 30 ft. high, with necessary arrangements for distributing liquor; valves, connexions, &c.

Contract No. 4.—One Station Meter, 10 ft. square, to pass 30,000 cubic feet per hour, with bye-pass, valves, and connexions.

Drawings and specifications may be inspected at the Offices of the Company, Chapel Lane, Wigan; and Tenders, addressed to the Directors, must be sent to the Offices, or to me, on or before the 17th of June next.

The Directors do not bind themselves to accept the lowest or any tender.

R. A. DARLINGTON, Law-Clerk to the Company.

Wigan, May 29, 1872.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

CONTRACT FOR COAL.

THE Directors of this Company are pre- pared to receive TENDERS for about 10,000 Tons of GAS COAL.

Particulars and conditions of tender to be obtained on application to the ENGINEER, at the works.

Tenders to be sent in by the 6th of July proximo.

North Street, Wandsworth, June 11, 1872.

TENDERS FOR GAS COAL.

THE Walsall Improvement Commis- sioners invite TENDERS for the supply of 10,000 tons of STAVELEY, YORKSHIRE, or any other good GAS COAL, which may be delivered either at Walsall Railway Station, or by boat at Walsall Gas-Works; in the latter case it will also have to be unloaded and stacked in the coal-shed, or such other place at the Gas-Works as may be directed. The Coal will have to be delivered at the rate of from 300 to 400 tons per week from the date of the contract till the 1st of February next, and after that date at the rate of from 200 to 250 tons per week, as the Commissioners may from time to time require.

The weight, if delivered by rail, must be long weight; if by boat, it must be 22 cwt. to the ton, boat gauge. Payments monthly.

The Commissioners do not bind themselves to accept any tender, and they reserve the right to divide the contract between several firms.

Tenders sealed, and marked outside "Tender for Gas Coal," and stating the price for large Coal and also for Nuts, are to be sent to the undersigned on or before Thursday, the 27th inst.

SAMUEL WILKINSON, Commissioners Clerk.

Bridge Street, Walsall, June 10, 1872.

COAL TAR AND AMMONIACAL LIQUOR.

THE Corporation of Paisley invite TENDERS for the TAR and LIQUOR produced at their Gas-Works, Blackstone Road, for a period of from Three to Five years, as may be agreed upon, from the 15th of July, 1873.

The Tar and Liquor to be sold separately, and both at a rate per 100 gallons—the latter according to strength, taking 2½ degrees (Twaddell) as the minimum, and advancing at a rate for each half degree added. Terms—Monthly payments.

The Contractor to furnish an abundant and regular supply of casks, and take delivery at the works. Facilities will be given him for their removal by railway, which communicates with the works.

Sealed tenders, marked "Tender for Tar and Liquor," to be lodged with WILLIAM HODGE, Esq., Town-Clerk, Paisley, on or before the 12th of July next.

The Corporation will not be bound to accept the highest or any tender.—By order,

GEO. R. HISLOP, Engineer and Manager.

Gas-Works, Paisley, May 30, 1872.

PRIVATE TELEGRAPHS FOR GAS AND WATER WORKS.

THE Electric Telegraph Department of our business is most efficiently conducted by an experienced staff. CONTRACTS entered into for maintenance and erection of lines for Gas and Water Companies, private residences, hotels, &c. Bailey's simple A B C instrument is stronger and less liable to derangement than any other in the market. Price £6 per pair. Makers of maximum and minimum Electrical Indicators and Signals for Reservoirs. Water Pressure Recorders. Managers of Gas and Water Works are invited to ask us for our quotations, or for any information connected with Telegraphy.

Just published, 800 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, Lancashire.

SWANSEA GASLIGHT COMPANY.

CONTRACT FOR GAS COALS.

THE Directors of this Company invite TENDERS for the supply of 10,000 tons of the best GAS COALS, during the twelve months ending the 1st day of July, 1873, in such monthly quantities as is hereby specified:—

July, 1872	500 tons.
August, 1872	600 ,,
September, 1872	800 ,,
October, 1872	900 ,,
November, 1872	1200 ,,
December, 1872	1200 ,,
January, 1873	1000 ,,
February, 1873	1000 ,,
March, 1873	900 ,,
April, 1873	800 ,,
May, 1873	600 ,,
June, 1873	500 ,,

The Coals are to be the best of their several kinds, to be as free as possible from sulphur, bats, bind, refuse, and dirt. To be delivered dry and in good condition, free of all rates and charges, on to the Company's weigh-bridge at the Gas-Works, Swansea.

Terms of payment on or about the 14th day of each month, in cash, less 2½ per cent. discount.

The South Docks are within 160 yards of the gas-works, and rails are laid from the works in direct communication with the whole of the narrow-gauge system.

Each tender must state the prices per ton; quantities and description of Coals proposed to be delivered; whether screened large, rubble, through and through, nuts or cobbles; and the veins from which the Coals are worked.

The Directors reserve to themselves the right of accepting or rejecting one or more tenders for the supply of a portion or the whole quantity of Coals required; and likewise they do not bind themselves to accept the lowest or any tender.

Inquiries may be made, and sealed tenders be addressed and sent in to me, the undersigned, on or before Tuesday, the 25th day of June next.

THORNTON ANDREWS, Secretary and Manager.

Swansea Gas-Works, May 23, 1872.

MIDDLETON AND TONGE IMPROVEMENT ACT, 1861.

TO IRONFOUNDERS, &c.

THE Middleton and Tonge Improvement Commissioners desire TENDERS for the making and fixing Four complete New Cast-Iron PURIFIERS, 14 ft. square each, and 4 ft. 6 in. deep.

Also Two New Wrought-Iron SCRUBBERS, 6 ft. diameter each, and 16 ft. high.

Drawings and specifications of the same may be seen at the Commissioners Rooms, Gas Street, Tonge, Middleton, on and after Monday, the 17th inst.

Tenders, sealed and endorsed, must be addressed to the Chairman of the Gas Committee, and delivered at the Office of the Clerk, on or before Monday, the 10th inst.

The lowest or any tender is not necessarily accepted.

By order,

JAMES WRIGLEY, Clerk to the said Commissioners.

Commissioners Rooms, Gas Street, Tonge,

Middleton, June 13, 1872.

TO MANURE MANUFACTURERS.

ONE Thousand Tons of spent Oxide of IRON, containing 40 to 50 per cent. of Sulphur, for sale.

Address OXIDE, Deacon's, LEADENHALL STREET, E.C.

TO MANAGERS OF GAS-WORKS.

OXIDE OF IRON, of good quality, delivered at Haydon Bridge Station, and forwarded to any part of England or Scotland.

For price, &c., apply to Mr. ROBERT LISTER, Haydon Bridge, NORTHUMBERLAND.

OLD RETORTS, old Cast and Wrought Scrap, and Metals of every kind, Borings, Turnings, &c., purchased by HUDD AND CO., General Factors, Metal and Machinery Merchants, No 6, Castle Terrace, NOTTINGHAM.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 43, Parliament Street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

Demy 8vo., half bound roan, cloth sides, lettered, price 7s. 6d., by post 8s.,

THE

GAS MANAGER'S HANDBOOK,

CONSISTING OF

TABLES, RULES, AND USEFUL INFORMATION

FOR GAS ENGINEERS, MANAGERS,

AND OTHERS ENGAGED IN THE

MANUFACTURE AND DISTRIBUTION

OF

COAL GAS.

BY THOMAS NEWBIGGING, A.I.C.E.

W. R. KING, 11, BOLT COURT, FLEET STREET.

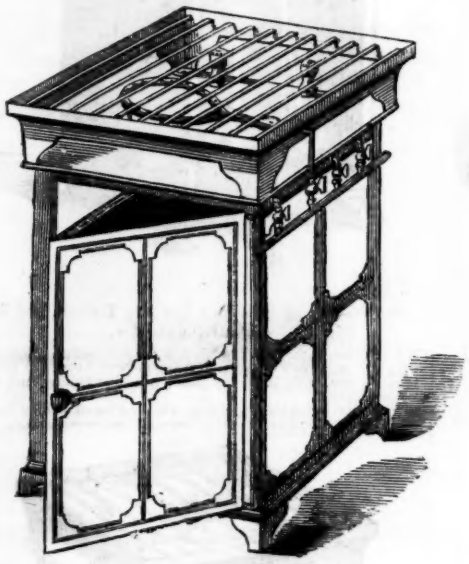
JOHN WRIGHT & CO.

RESPECTFULLY submit the accompanying Designs of Gas Cooking Stoves to Gas Managers as the best that are yet introduced, and will be happy to submit Drawings and lowest net prices.

Many Gas Companies have adopted the plan of buying these Stoves and increasing the consumption of Gas in the Summer months by letting them out on hire to their customers at a charge of 10 or 15 per cent. on the cost, to their mutual benefit.

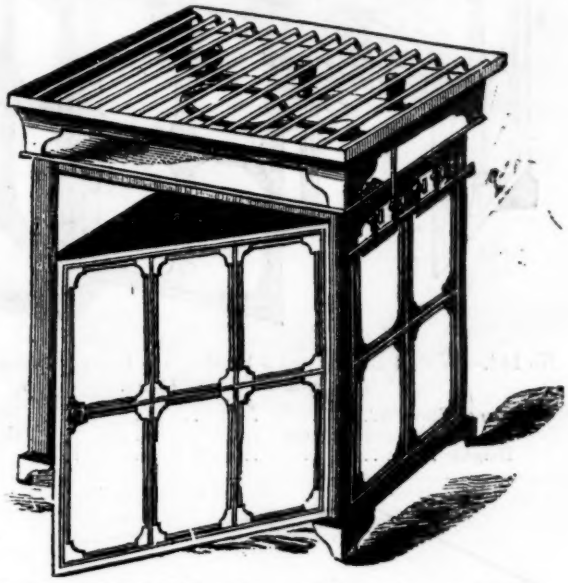
PORCELAIN GAS COOKING APPARATUS.

Are formed of thick White Porcelain Tiles, set in a strong and neat Iron Frame, and are the most cleanly and perfect Stoves made.



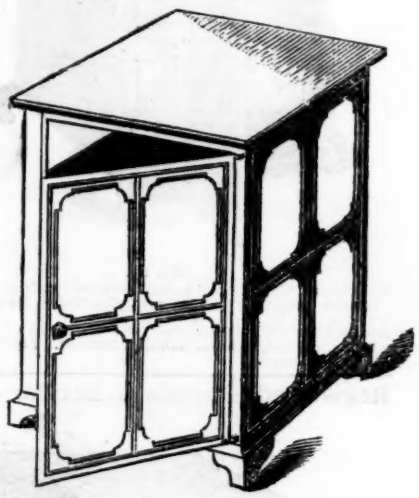
No. 140—With 2 Boiling Stoves and 1 Broiling and Boiling Stove on top.

Size of Stove	18×20 in.
Size of Top Boiling Frame ..	20×22 in.
Height	3 feet.

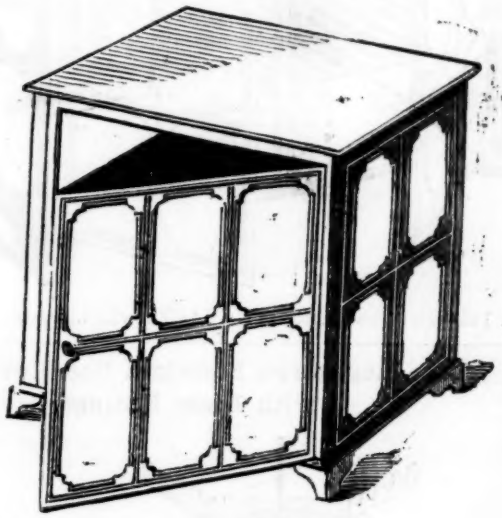


No. 142—With 3 Boiling Stoves and 1 Broiling and Boiling Stove on top.

Size of Stove	28×20 in.
Size of Top Boiling Frame	30×24 in.
Height	3 feet.



No. 141—Hot Closet, same as No. 140, but with no Frame or Stoves on top.



No. 143—Hot Closet, same as 142, but with no Frame or Stoves on top.

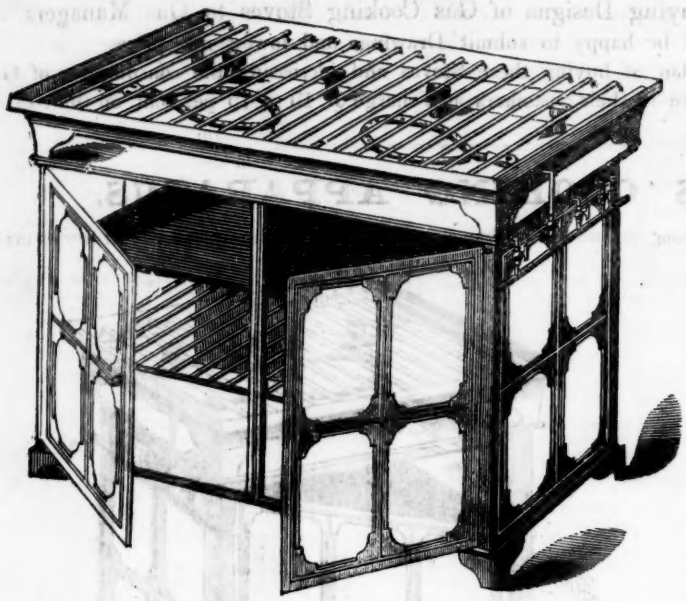
JOHN WRIGHT & CO.,

MANUFACTURERS TO THE TRADE,

30, Broad Street, Islington, Birmingham.

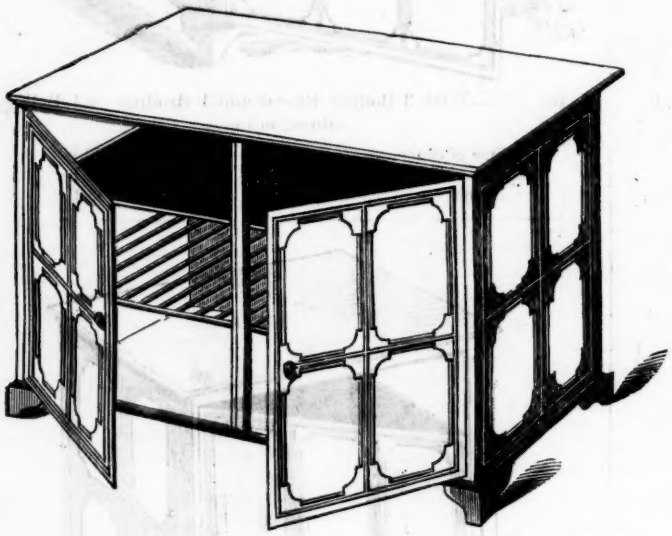
JOHN WRIGHT & Co., Manufacturers to the Trade.

Porcelain Gas Cooking Apparatus.



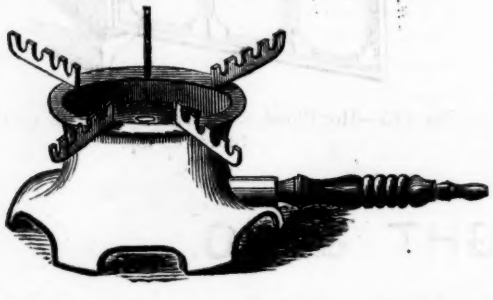
No 144.—With 4 Boiling and 2 Broiling and Boiling Stoves on top, and with 2 Folding Doors.

Size of Stove	36 × 20 in.
Size of Top Boiling Frame	40 × 24 in.
Height	3 feet.



No. 145—Hot Closet, same as No. 144, but with no Frame or Stoves on top.

Registered Porcelain Gas Stove, with Brass Fittings.



No. 400.

This is a very elegant and cleanly-looking Stove, and well adapted for Table use.

Improved Square Gas Cooking Stoves, With Atmospheric Burners.

No. 65—With Cast-iron Top and Bottom, and Stout Plate-glass Door.

14 in. Square, with 16 in. top plate, with one small Boiling Stove on top.
16 in. Square, with 18 in. top plate, with one Boiling and Broiling Stove on top.
18 in. Square, with 20 in. top plate, with two small Boiling Stoves and one large Boiling and Broiling Stove on top (as engraving).

No. 64.

18 in. Square, with two small Boiling Stoves and one large Boiling and Broiling Stove, with Heat Reflector. Top Boiling Plate 21½ inches square.
24 in. Square, with two folding doors, two small Stoves, and one large Boiling and Broiling Stove, with Heat Reflector. Top Boiling Plate 26½ inches Square.

Registered Porcelain Broiler.—No. 48.

Top Plate 15 in. square, 12 in. high.
Will cook a Fowl, or toast Bacon, Chop, Steak, or Bread inside, and boil 3 or 4 Saucepans on top.

30, BROAD STREET, ISLINGTON, BIRMINGHAM.

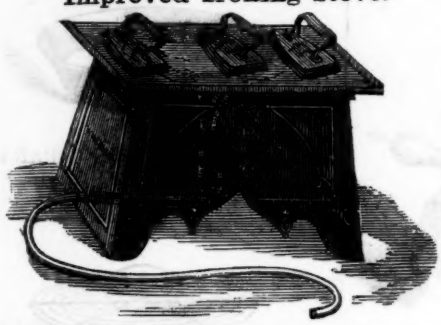
JOHN WRIGHT & Co., Manufacturers to the Trade.

No. 240.

Wright's Improved Stove, with Atmospheric Burner, **for Heating Tailors' Irons.**

For 1 Iron	..	For 3 Irons	..
,, 2 Irons	..	,, 4 Irons	..

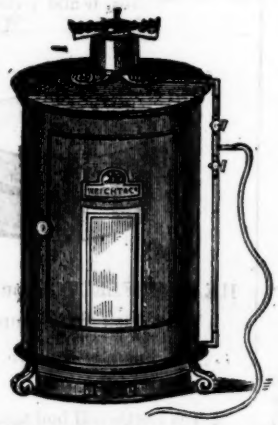
Improved Ironing Stove.



No. 245—Will heat 3 Flat Irons at one time. It is also well adapted for **Hatters' Irons.**

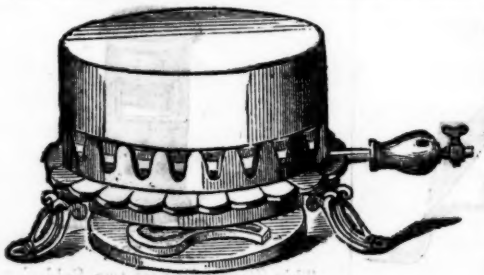
Improved Round Gas Cooking Stoves,

With Atmospheric Burners.



ROUND COOKING STOVE—No. 68,
With Cast-iron Top and Bottom, and Glass Door.

11-inch diameter,	with	12-inch	top plate
14-inch diameter	,,	15-inch	do.
16-inch diameter	,,	17-inch	do.
18-inch diameter	,,	19-inch	do.



Nos. 52 & 54.

No. 52—Improved Boiling and Broiling Stove. This is a very strong Stove, with powerful Atmospheric Burner; will broil under and boil above at the same time.

No. 54—Same Stove, but size larger.

Gas Hot Closet, No. 66.

This Hot Closet has folding doors, and is heated by a very small quantity of Gas.

It can be placed in a Kitchen, Dining Room, Ante-room, or Passage, as may be most convenient.

Size—24 in. wide, and 24 in. deep from back to front, with 3 Shelves.
,, 36 in. wide, 24 in. deep from back to front, and 3 ft. 3 in. high, with 3 Shelves.

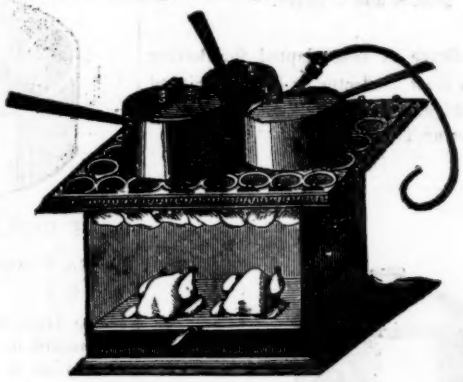
Registered Portable Hot Plate, Heated by Gas.

No. 356.

20 in. long × 10 in. wide. 4 in. high.
This is a most useful article in any Kitchen.

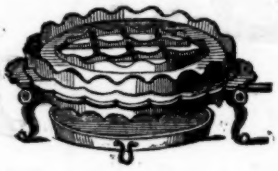
Registered Gas Cooker,

For Boiling, Broiling, and Toasting.



No. 28—Top Plate 19 × 17 in.
No. 38—Top Plate 19 × 22 in.

This Stove effectually and economically boils 3 or 4 Saucepans, and cooks (by reflection) Chops, Steaks, a Small Joint, or pair of Fowls. It also makes Toast, and acts very nicely as a Salamander. As the heat can be regulated to the greatest nicety, it is highly recommended for making Preserves, Stews, or anything requiring gentle Boiling. It is a most useful apparatus in any kitchen, and in large establishments will be found a very valuable auxiliary.



No. 46.

A most useful apparatus; will Boil or Stew and Broil or Toast underneath at the same time.

30, BROAD STREET, ISLINGTON, BIRMINGHAM.

JOHN WRIGHT & CO., Manufacturers to the Trade.

REGISTERED GAS STOVES, ADAPTED FOR BOILING & BROILING.

Nos. 6 and 7 Stove.

Showing Chop Cooking under Stove. Heat Reflector or Diffuser being placed bottom upwards to throw down the heat.

Nos. 6 and 7.

BOILING AND BROILING STOVE.

No. 6, 10 in. diameter.
„ 7, 11 in. „

Nos. 6 and 7 Stove.

Showing Stove as best adapted for Boiling only, with a Heat Reflector or Diffuser placed under the Stove, reflecting all the heat to the top, for boiling purposes.

Nos. 6 and 7 Stove.

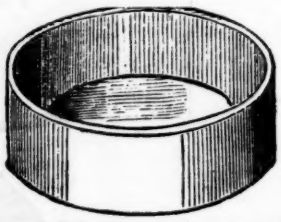
Showing Stove as best adapted for Boiling only, with a Heat Reflector or Diffuser placed under the Stove, and reflecting all the Heat to the Saucepan or Tea Kettle.

Nos. 6 and 7 Stove.

Showing Chop cooking under Stove, and Potatoes, &c., baking in the Small Oven formed by 2 Heat Reflectors or Diffusers placed on top.

Nos. 8 and 9, DRIPPING PANS, for Nos. 6 and 7 Stove.

Nos. 10 and 11, GRIDIRON, for Nos. 6 and 7 Stove.



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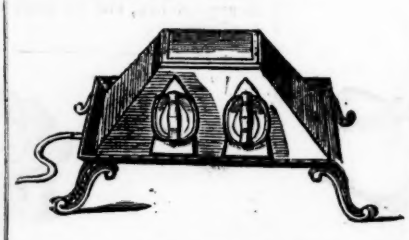
HEATED WITH GAS.



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No. 520.

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CONTENTS.

	PAGE
Notes upon Passing Events:—	
Parliament and Parliamentary Committees	565
The Birmingham Sewage Bill	565
The Mid-London Railway	565
Mr. Hawksley's Presidency	565
Captain Tyler on Railway Amalgamation	566
The Opposition to the Thames Embankment Bill	566
The Schemes of the Metropolitan Board	566
Entire Abolition of Turnpikes in the Metropolis	566
The Strike in the Building Trades	566
The Report of the Joint Committee on Tramways	566
Circular to Gas Companies:—	
A General Rise in the Price of Gas	567
The Gas Difficulty at Ryde	567
The Purchase of the Hereford Gas Undertaking	567
The Scheme for the Amalgamation of the Chartered and Western Gas Companies	567
The Meeting of the British Association of Gas Managers	567
Blackburn in Darkness	568
The Cost of Asphalte Roads to Gas Companies	568
Correspondence between the Gas Referees and the Board of Trade	568
Correspondence:—	
The Collection of Gas Accounts	568
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	568
Progress of Bills in the House of Commons	568
Legal Intelligence:—	
Court of Exchequer—Sheffield Water Company *v.* Bennett	569
Miscellaneous News:—	
The Strike among the Gas-Tube Makers at Dudley	570
Non-payment of a Gas and Water Account	570
Proposed Sale of the Dumfries Gas-Works	570
Meeting of the Bombay Gas Company	571
A Visit to the Leicester Water-Works	572
Liability for Gas-Rate	574
British Association of Gas Managers	574
Transfer of the Kilmarnock Gas-Works	583
Sale of the Heckmondwike Gas-Works to the Local Board of Health	583
Rise in the Price of Gas at Bradford	583
First Fruits of the Ryde Gas Arbitration	583
Hebden Bridge Gas Company	583
Supply of Water to Hamilton, N.B.	583
Supply of Water to Dundee	583
Ayr Water Company	583
Return by the Metropolitan Association of Medical Officers of Health of the Average Composition and Quality of the Metropolitan Waters, in June, 1872	584
New Sewerage Scheme for Chester	584
Accident at the Radcliffe Gas-Works	584
Register of New Patents:—	
Warner and Brooke—Pumps	584
Preston, F. P., Prestige, J. T., Preston, E. J., and Prestige, W. A.—Waste-Water Preventer Cisterns	584
Brown, J.—Irrigation of Land, &c.	584
Lewtas, J.—Lamps	584
Morrison, J. D.—Purifying Water, &c.	584
Hancock and Pearse—Production of Gas	584
Cameroy, E. A.—Regulating Pressure in Delivery-Pipes	584
Hosken and Fleury—Water-Waste Preventers	584
Croll, A. A.—Meters for Water, &c.	585
Goldsmith and Dilkes—Heating by Gas	585
Barclay, A.—Coking Coal and Generating Gas	585
Johnson, J. H.—Utilizing Gases from Blast Furnaces	585
Beckett and Cam—Treating Sewage	585
Pearson, T. C.—Filters	585
Roberts, T.—Filtering Liquids	585
Lupton, J. I.—Deodorizing and Utilizing Sewage	585
Beasley, J. W.—Ball-Valve or Tap	585
Smith, T. J.—Lighting and Extinguishing Gas	585
Grabham, E. J.—Regulating Gas	585
Moore, W. H.—Filters	585
Breach, J. R.—Gas-Fires	585
Applications for Letters Patent	585
Grants of Provisional Protection	586
Notices to Proceed	586
Patents which have become void	586
Share List of Metropolitan Gas Companies	586
Price Current	586

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 2, 1872.

Notes upon Passing Events.

WHEN next Mr. Dodson introduces his proposals for the reform of private Bill legislation, is it pretty certain that some member of Parliament, less bound down by conventional courtesies than the ex-Chairman of Committees will advert to the extraordinary examples of contempt exhibited by both Houses of Parliament for the decisions of parliamentary committees. In one instance the laborious investigations and conclusions of a committee, presided over by a very experienced member of the House, were upset by the canvass of two country gentlemen, assisted by that eminent joke-maker and retailer, Mr. Bernal Osborne—"a fellow of infinite mirth," always ready to lend a hand to a brother dandy, or one who had belonged to that noble army of martyrs when the thing existed, before it was extinguished by the modern athletic swell. Sir Charles Adderley we know—a ponderous gentleman, very fond of sanitary reform in the abstract. He has manufactured a reputation as a reformer out of his acres, his baronetage, and his dull industry, having taken to that little cultivated branch of domestic economy when his first love, the Colonial question—another of Sir Charles's failures—was played out. Sir Charles is quite ready to introduce compulsory sanitary legislation for England, but when Birminghan, with its hundreds of thousands of souls, wants a few acres for disinfecting its sewage, he would sooner let the whole community perish in its filth than that the bones of the ancestral Adderleys, snugly reposing in an ancient churchyard, should run the least chance of adding ammonia to their natural phosphates. When next the Warwickshire baronet rises to lecture the House on sanitary legislation, some profane member of the Opposition will be apt to characterize his peculiar eloquence as "Brummagem"—an ancient name for sham. As for his coadjutor, Sir Robert Peel, the amazing thing is that such a middle-aged boy can find a follower on any subject in a grave assembly. Dryden drew him with—

> Stiff in opinion—always in the wrong,
> And everything by turns, and nothing long.

We might, if it were safe, go on, and paraphrase pretty closely the next two lines. But there was this to be said for the two reactionary combatants—they had a direct personal interest in the question. They were landowners, and "fought for their own lands." The House of Lords case is considerably worse, for there the labours of the committee were sacrificed to the consistent prejudices of the Duke of Marlborough, a peer who is only too happy when he can find an opportunity of checking the progress of a railway, or anything else more modern than 1830. The duke has a reputation for piety on metropolitan platforms, but has not contrived to secure the respect of the Oxfordshire farmers, although, in virtue of his rank, he is a vice-president of divers agricultural societies. Nothing but this reference to the Duke of Marlborough's private character as a domestic Tory of the old school will explain his conduct in the matter to which Mr. Hardcastle has drawn attention in a letter of very unusual character to be written by so experienced a member of the House:—

Certain proceedings of the House of Lords during the past week afford a remarkable illustration of the fact that by the rules of each House a private bill promoted in one House may, after having passed through all its stages in that House, be rejected without discussion in the other.

A project called the Mid-London Railway occupied the attention of the committee, of which I had the honour to be the chairman, for, I think, 16 or 17 days during the present session. It consisted of two sections, comprised in two separate bills—one for a railway from Willesden to the Marble Arch, the other from the Marble Arch to the extreme East of London. This last, the eastern section, was rejected, on the ground that the committee, although seeing no cause to doubt the *bona fides* of the scheme, were not satisfied that the promoters would succeed in providing the very large capital required—a sum of four millions of money. Of the former, or western section, the preamble was declared to be proved, and, though opposed "on consideration," it was carried by a majority of 57.

Under these circumstances, when the western section came to a second reading in the House of Lords, the Duke of Marlborough moved and carried its rejection without a division, thereby contemptuously neutralizing the result of four weeks hard work on the part of the committee of the House of Commons, to say nothing of the decisions to which that House had come both on the second reading and on consideration of the report of the committee.

If the Duke of Marlborough had taken the precaution of concealing his reasons, it might have been supposed that he had exclusive knowledge of something objectionable in the scheme. Unfortunately, however, he made a speech, by which he showed that he had either not read or did not understand the bill itself, or the evidence taken before the committee of the House of Commons. He argued:—

First, that the bill, if passed, would displace a large number of the working classes; second, that it was intended to raise the capital by "financing;" third, that the bill, if passed, would give an undue advantage to the eastern section scheme on a future occasion.

As to the first of these objections, if the duke had taken the trouble to read the bill, he would have found that it contained a special clause, framed by the Home Office, for providing a site for working people's dwellings, the first clause of the kind, as I believe, ever inserted in a railway bill, and if he had taken a little more trouble he might have ascertained that Peabody's trustees were not unlikely to occupy this site.

As to the second objection, as the committee specially rejected the eastern section of the same scheme because they entertained doubts as to the "ways and means," the duke might, I think, have given them credit for not overlooking this question as regarded the western section; besides which it is to be observed that the capital was to be only £800,000, one-fifth of the proposed capital of the section rejected, and that an arrangement had been made with the London and North-Western Railway to work the line.

The third objection is not worth notice.

The third objection was that the success of the Bill for the western section would be a fulcrum for reintroducing the eastern in another session. It is such stupidities that make the world sometimes forget the elements of wisdom and discretion included in the House of Lords.

Mr. Hawksley seems determined to make it difficult for the next President to exceed, if he can equal, him in legitimate popularity. By a bold innovation, he substituted for the usual Presi-

dent's *conversazione* at the rooms of the Institute an invitation to his professional friends and their wives or daughters to a very brilliant *soirée* at South Kensington, and he has completed the circle of pleasant intercourse by a sort of field lecture to the students of the Institute, the scene being the water-works and reservoirs which supply Leicester—a lecture which partook of a pic-nic, for it ended with a collation and the customary speeches. Nothing can be better than the admixture of hospitality with practical or scientific work, where the feeding does not, as in the City, form the *raison d'être* of the whole performance. How is it that in great water questions, like that agitating the people of Bermondsey, the Board of Trade never thinks of calling in such an authority as the present President of the Institution in his character as President?

A paragraph is going the rounds of the press to the effect that Captain Tyler, the Royal Engineer-Inspector of Railways, gave evidence before the Amalgamation Committee in favour of the purchase of railways by the State. Of course he did. Every corporal would like to be a colonel, and every captain a general commanding in chief.

The opposition to the Thames Embankment Bill, for upsetting the recommendations of the committee of 1871, and for handing over to Mr. Gore's management a large slice of the land reclaimed by the money of the metropolitan inhabitants, appears not to be successful, and the counsel of the Metropolitan Board has retired from the contest to reappear before the House of Lords. If the ratepayers are sacrificed to the grasping plans of the Woods and Forests and the morbid love of unpopularity which seems to possess the Chancellor of the Exchequer, good may come out of evil. It may lead to a determined attack on the irresponsible dictatorship of the Woods and Forests—true representatives of the horse-leech, who grasp everything and give nothing, unless it is to a Duke of Buccleuch.

If the proverb be true that everything comes to him who can afford to wait, the Metropolitan Board has a great future before it. Provided with funds without the unpopularity of taxation, and a great many duties, large and small, to perform, it is constantly on the look-out for some accession of pence and power. Its roundabout Street Improvement Bill has sailed through the Commons committee without opposition, while the rival Mid-London Railway Bill has been defeated, horse and foot. The members of the Corporation who take the trouble to think of the future must be uncomfortable when contemplating an enemy so slow, sure, and wide awake. The last bone of contention is Epping Forest, which it is to be hoped the Corporation will snatch from the jaws of the dog in the manger—the Metropolitan Board—for the Corporation has the funds to buy up the forest, and make it free, while the Board cannot spare a *sou*.

The release from the bondage of turnpikes has come to the metropolis sooner than we expected, thanks to the decision of a country gentleman of the old sort—Lord Hylton—for country gentlemen do not love turnpikes. All these abominable impediments to road-travel round London disappeared on Monday last, including that great assistant to gibbing horses—the toll on the ascent of Lea Bridge. We are, we must confess, surprised that no *laudator temporis acti*—no one following Lord Eldon's motto, *stare super antiquos vias*—has arisen to bemoan the fate of the disestablished and disendowed pikemen; their interesting wives and children deprived, by the confiscatory decree of the Legislature, of their accustomed and only mode of livelihood. When we are called on to feel deeply for Thames watermen, for publicans and potboys, and every class of monopolists strong enough to command votes in Parliament, why should not the humble pikeman have his advocate and his laudatory epitaph?

The struggle for less work and more pay between the great London builders and their men goes on, and is likely to go on, in spite of pretended willingness on either side to refer to arbitration what is, after all, a question of supply and demand. The masters are capitalists, or appear to be; those who are rich enough will retire from so unsatisfactory a trade, those who are strong will hold out or only yield when they see their way to a profit out of future transactions. The weak (financially) will find a very plausible reason for a liquidation, the modern euphonism for insolvency, in the attitude of these men. The unionists are also strong in their organization and funds, and will enjoy "playing" this fine weather. Whether they will enjoy it as much when the winter comes round, and the time of working is shortened by natural causes, will depend on the demand for buildings, public and private. There is nothing extraordinary in a rise of wages when most of the necessaries of life are so dear; the odd thing is the attempt to make more work by lessening the working power of each man by an hour a day—to gain an hour that a great many will be puzzled to employ out of the public-house. Of one thing only we may be sure, that no arguments from the employing class, however sound, will reach the ears of the associated building trades; but there is one trade now stirring for a minimum of wages and shortened hours—the painters—who, if they persist, will certainly cut their own throats. For painting there is a great demand in fine weather, and very little in winter or the hottest months. Surely it should be the object of such a trade to make as long hours and as much money as possible in the good seasons. It is an art easily learned, and any attempt to screw up wages to an unnatural point will certainly bring in a large number of outsiders. There is another point, to which Sir Charles Trevelyan has called attention in a letter bearing his well-known initials:

> For every skilled artisan who goes out on strike, several unskilled labourers are thrown out of employ. The artisans have the funds of their trade unions to fall back upon, but who will support the labourers and their families? At the East End they were thrown upon the poor law and charity, to the miserable demoralization of our population; but this will not be tolerated a second time. If there is to be a trade war, it must be supported by the resources of the combatants, and not by those of the rest of the community. The disastrous consequences of a prolonged suspension of the building trade of London, supported out of the inexhaustible purse of London legal and charitable relief, would be incalculable.
>
> If the strike continues, there must be an exodus of unemployed London workmen to the places were labour is so much in demand, and to this extent good will be done.

The report of the Select Joint Committee of the House of Lords and House of Commons on Tramways in the Metropolis, will not set the Thames on fire. In fact, it reminds us of the recipe for criticism on art in the "Vicar of Wakefield," "that the painter would have done better had he taken more pains." It is an eminently sensible and cautious report, which could not have emanated from any French or American committee. There is no fine language, and no attempt to fit all circumstances to one theory; quite in the French style is the evidence of Mr. Scott and Mr. Farrer:

> With regard to the authority under which the construction and management of metropolitan tramways should be placed, Mr. Scott, C.E., the surveyor of the vestry of St. Pancras, and Mr. W. J. Farrer, the High Bailiff of Westminster, were equally opposed to the construction of tramways by private companies. Mr. Scott thinks "the best way in which tramways should have been constructed in the metropolis would have been by the establishment of a separate and independent board, simply for the purpose of constructing tramways, and taking under their management the whole of the roadways in any street in which a tramway was constructed, and letting by tender the working of all tramways by private companies." Mr. Farrer gave, as the opinion of the vestry of St. George's, Hanover Square, of which he is a member, and in which opinion he heartily concurs, that the vestry object altogether to the construction and maintenance of tramways within the metropolitan area by private companies, and he states that they have even gone so far as to memorialize the Board of Works upon the subject, and have invited them to undertake the works themselves for the benefit of the ratepayers. There has been a correspondence between the vestry and the Board of Trade on this subject, the former expressing their belief that under present circumstances tramways will not be laid down by private companies on any comprehensive plan for the benefit of the London public, but in such districts only as may seem to offer the largest pecuniary return.

Now, this would be all very well if the metropolitan public were agreed on the necessity of tramways, and there was any fund from which they might be constructed without taxing the irrepressible ratepayer. But it is not so. The ratepayers, as a body, were decidedly disinclined to enter into the speculation. You might just as well have asked them to construct a railway, or set up an omnibus company. Taxpayers in this country have votes, and, as a rule, decline to risk their money in new undertakings. There is not a doubt that the road authorities might have advantageously constructed tramways on a comprehensive plan, and let them at a profit to the omnibus companies to find plant and locomotive power; but, if we had waited until even two vestries had agreed to work together, tramways might still have been in the shell of theory. As it is—with some inconvenience to light carriages—they are at work, and extensively patronized by the twopenny and penny public on both sides of the Thames. They have created a new traffic, for they are crowded with women in charge of children riding for very short distances. Indeed, the facility of ascending and descending from the tram cars, with the low charge, creates customers who would never use an omnibus for the same distance. If the cars had travelled empty, it would have been an irresistible argument against their extension; but, as they are crowded every morning and evening, and on all holidays, it is not necessary to ask whether they are useful. The greatest drawback to the system is the necessity of reintroducing noisy cube pavement—destructive to horses and to carriages—in the place of macadam pavement. Pavement and macadam do not go well together. On this point the committee justly observe:

> At present the company repairs the pavement on which the rails are laid, and the road authorities the remainder of the road. The pavement, it appears, very frequently wears away on the sides of the iron rail, leaving two deep ruts, while the macadam road and the pavement seldom remain at the same level. The wheels of light carriages and carts are in consequence more or less damaged in crossing obliquely from one side of the road to the other.
>
> Some witnesses stated that the pavement was much used by the public in preference to the road on each side of it, which on that account required less repair at the expense of the parish. But this could only occur when the pavement was in repair, and the cars did not follow each other in quick succession. The public interests, however, require that the road should be kept in perfect repair and under one management, which can be best secured by the Tramway Company being obliged to repair the whole road in such manner as the road authorities may direct, receiving from them an annual sum, to be settled by contract, sufficient to keep in repair that portion of the road for which it is still responsible.

The expectation that asphalte, or some other mode of constructing smooth roadways, will render tramways unnecessary, we look on as absurd for the plainest financial reasons. A tramway is either laid down by a company at its own expense, or, owned by the parish, would be paid for by the company that worked it; but a street paved at great cost with asphalte or wood, would cost the ratepayers a great sum without any direct returns. The committee wisely decline to commit themselves to any general principles, and recommend that every scheme should be considered on its own merits. They sum up their conclusions with the following modest but sensible resolutions:—

1. We recommend that the same consents of local and road authorities should be required in the case of Bills as is required by the General Act in the case of Provisional Orders, and that an alteration be made in the Standing Orders to that effect.
2. We are decidedly of opinion that the entire roadway should be maintained by one body, and not divided, as at present, between the Tramway Company and the road authority. The evils arising from this division of authority have been brought very prominently before the committee, and it appears almost impossible to preserve the proper level of the road so long as the present arrangements continue.
3. Where for more than 30 feet there is a less distance than 9 feet 6 inches between the kerb and the rail, we recommend that special notices should be given to each of the frontages whose houses may be affected.

The committee are finally of opinion that the fullest consideration should be given by committees to the interest of the public in the use of the streets as well as of the owners and occupiers of the adjoining houses. With these precautions, the committee do not see any objection to the construction of tramways by private enterprise.

Circular to Gas Companies.

The late extraordinary rises in the price of coal and of wages—the former amounting to from 4s. to 7s. per ton, and the latter to from 35 to 50 per cent.—are now beginning to produce their natural and inevitable consequence, a general rise in the price of gas. We have in past numbers mentioned several places in which advances have been made, and to-day have to add some other towns to the list. In the south at Faversham, Gravesend, Hastings, and Maidstone, and in the north at Bradford and Whitehaven, notices have been given of an advance, in one case to the extent of 1s. per 1000 feet. In London also the Imperial Company have found it necessary to reimpose the 1d. per 1000 feet they took off but a short time ago. In future numbers we shall, no doubt, have to chronicle an ever-increasing number of cases; for, so far as can be seen at the present time, no fall in the price of coal is likely to happen for a couple of years, and in any case it may be taken as certain that the price will never again be so low as it was before the rise began.

In the remarks in our last issue on what is very appropriately called the "gas difficulty" at Ryde, the proceedings of the Corporation in relation to the purchase of the gas-works were not fully described, and it may be instructive to trace the several steps by which the present difficulty has been arrived at. The Ryde Improvement Act, 1854, gave the Commissioners—now the Corporation—permissive powers to purchase the gas undertaking, which powers the Ryde Gas Act, 1866, limited in their exercise to five years after the passing of the Act. Last year the arbitration was held to determine how much the Corporation should pay for the works, and the umpire awarded some £57,000. Under the 125th section of the Improvement Act, the Commissioners had power to borrow only £15,000 for all the purposes of the Act (exclusive of water), and it may be assumed that the money was expended by the commissioners irrespective of the purchase of the gas-works. In 1870 the Corporation, acting as a Local Board of Health, obtained a Provisional Order under the Local Government Act, 1858, authorizing them to borrow, for the purposes of the Public Health Acts, &c., a sum equal to two years assessable value of their district, and of this a sum sufficient to satisfy the award remained unborrowed. Under these circumstances the Corporation applied to the Local Government Board—first, for sanction to borrow the money unborrowed under their Provisional Order, and secondly to grant them a Provisional Order, altering the provisions of their local Act. In their notice of application, however, they did not include the 125th section of the Improvement Act, believing that the power to borrow under the Local Government Act (sec. 78) would be sufficient. An inquiry, which lasted two days, was held at Ryde, in the course of which, as we said, the Corporation, acting on the advice of counsel, withdrew the application for sanction to borrow under the Local Government Act, 1858, and determined to include this in their Provisional Order. It therefore became necessary to issue fresh notices, asking for power to alter and extend the borrowing powers granted by section 125 of the Improvement Act. These notices were issued and a second inquiry was held. But, unfortunately for the Corporation, a great change in public opinion had taken place in Ryde. The ratepayers who, at one time, had been clamorous for the purchase of the gas undertaking, were intensely dissatisfied with the amount awarded for the purchase, and at the second inquiry opposed in the strongest manner the granting of the Provisional Order. We are now informed that the decision of the Local Government Board has not yet been given. Meanwhile, the Corporation are being subjected to rather severe pressure. Mr. G. W. Stevenson has issued a writ against them for the recovery of £557, the balance of his account of £657 for professional services rendered to the Corporation in connexion with the arbitration. Other claims, amounting, it is said, to between £5000 and £6000 are being pressed; and, to crown all, it is understood that the gas company has ordered, or will order, a writ to be served on the mayor for the recovery of £58,447, the money due to them under the award for the purchase of the works. The Corporation must wait for the decision of the Local Government Board with some anxiety.

More fortunate than their brethren at Ryde, the Hereford Corporation obtained the sanction of the Treasury for borrowing the money necessary for the purchase of the gas-works in that city, and we believe the money was paid yesterday, and possession of the works given to the Corporation.

The scheme for the amalgamation of The Gaslight and Coke Company and the Western Gas Company has been agreed upon by the two companies, and lodged with the Board of Trade. Copies of the scheme can be had at the offices of the two companies. Objections to it must be sent to the Board of Trade on or before the 15th inst.

We conclude, in this number, our report of the papers read at the meeting of the British Association of Gas Managers, the majority of which call for but little notice. The modifications of the governor, described by Mr. Warner, in his paper "On Governors and the Governor Room," we are disposed to regard as improvements. In any case, we thoroughly agree with the author as to the value of districting a town, and working each district at the pressure most suitable for it, not only as to level, but also as to the nature of the consumption. In either case, not only is the amount of unaccounted-for gas smaller, but the consumption is much more satisfactory; gas blowing away at two inches pressure is always burnt to a disadvantage.

Mr. Hartley, in his paper "On Cooking by Gas," introduced a subject for discussion which we have repeatedly pressed on the attention of gas companies. The paper and the discussion were exhaustive, and we do not know that we can add anything of interest. A very desirable thing to promote cooking by gas in middle-class houses, and a matter, it seems to us, not impossible to accomplish, would be to adapt the ordinary cooking ranges found in such houses for the consumption of gas in summer.

Mr. Livesey's paper "On the Hydraulic Main" will probably command attention. It is very desirable to keep the tar in the main as fluid as possible; and, if this is accomplished by the use of a shallower main, great advantages are gained.

In a communication "On the Comparative Cost of Purifying Gas by Lime and Oxide of Iron," by Mr. Fish, will be found described what, we have no doubt, is a very effectual plan for revivifying oxide of iron, without removing it from the purifiers. Our readers know that this has already been attempted, but with only partial success, by forcing a current of air through the purifiers. More complete success has been obtained by Mr. Fish, who sends a stream of air and steam through the mass of spent purifying material. The mode by which a blast of air is created is ingenious, but not novel, though the application of it to the present purpose is Mr. Fish's own. It will be seen from the discussion that, in the opinion of several experienced engineers, the method of revivification described is perfectly successful, and the necessity for unloading and recharging the purifiers completely obviated. We do not know whether or not it would be worth while to attempt to save the ammonia detained in the oxide purifiers, instead of driving it away into the ventilating shaft, but the experiment might be tried.

We have alluded above to the "increased price of coal as "affecting gas companies," but may here direct attention to Mr. Jones's paper on the same subject. Mr. Fraser's statement of the rise in the price of Scotch cannels is an alarming one for the gas undertakings in Scotland, whose Acts compel the supply of gas of high illuminating power. Doubtless, in some places, the increased value of products will, to some extent, balance the increased cost of coal, but it can only do so to a small degree. If the London companies should adopt the suggestion of Mr. Livesey, and combine to raise the price of coke, we believe hey will simply stop a great part of the consumption.

The next meeting of the Association will be held at Edinburgh, under the presidency of Mr. A. A. Croll. We do not know whether or not it would be possible to hold a combined meeting of the British and North-British Associations (that is, for the reading of papers), but the matter may be worthy the consideration of the committees of both associations. The British Association has adopted "the principle of awarding premiums for papers," which the Scottish Association has practised, with success, for some years, and we hope some valuable essays will be the result. A

resolution, affirming the desirableness of establishing a benevolent fund, was also carried, and it was referred to the committee to arrange the details. The excursion party, 250 in number, favoured with beautiful weather, visited the Beckton works, and also the new works of the Imperial Company, at Bromley, at which latter they were hospitably entertained by the engineers, Messrs. Kirkham and Clark, and so the meeting came to a pleasant end.

The Corporation of Blackburn would appear to have been seized with a fit of parsimony, under the influence of which they have extinguished all the public lights in the borough for the summer months. Indignant newspaper writers protest against this innovation, which they regard as a direct invitation to garrotters and burglars.

However economical asphalte roads may in the end prove to be to highway authorities, they are far from being economical to gas companies, who are often of necessity compelled to break them open; for whereas in the case of a granite paved way an opening costs the gas company only 2s. 6d. per yard, the same extent of asphalte involves a charge of 15s. 6d. Under these circumstances a gas company can hardly be expected, in asphalted districts, to continue to lay pipes to a consumer's premises free of charge.

On the motion of Mr. Alderman Lusk, copies have been published of correspondence between the Gas Committee of the Corporation of London and the Board of Trade, and between the Metropolitan Board of Works and the Board of Trade relative to the appointment of gas referees, and also of the correspondence relative to the quantity of sulphur in the Chartered Company's gas. With this has been issued the report on sulphur purification at Beckton, which has already appeared in our columns. With regard to the correspondence, we can only regret that, under present circumstances, it was not allowed to lie in oblivion in the presses at the Board of Trade. The publication can serve no useful purpose at the present moment, and some of the correspondence is likely to excite considerable heartburning. It is to be regretted also that the referees could not, in their correspondence, relating to matters in dispute between them and the leading gas examiners, adopt a more conciliatory tone—not writing almost contemptuously of what "this gas examiner thinks "preferable," and complaining of the "licence assumed by the "municipal gas examiners, whose sole duty it is to carry out the "instructions of the referees," because one of them ventured to call in question the fairness of a part of their instructions. Much vexation of spirit, and possibly a good deal more, might have been spared them if they had not shown such a despotic disposition. Other personal differences revealed in the correspondence we shall not further allude to.

The circumstances attending the sulphur report we have published are somewhat curious. It is dated January 31; but, somehow or other, it appears to have taken two months in getting from John Street, Adelphi, to Whitehall. It contains what we thought was a full and complete account of all that had been done at Beckton, and at other stations of the Chartered Company, in relation to sulphur purification, with the recommendations made by the referees after an exhaustive study of the whole question. But on the 15th of February the secretary of the referees writes—and this letter appears to have been six weeks on its way to Whitehall—that the referees have "required the Chartered "Company to furnish them with a statement of all they had done, "and what professional advice they have received on this subject, "especially suggesting that, for the satisfaction of the public," Drs. Odling and Letheby should be invited to inspect the works. The correspondence concludes with letters from the Board of Trade to the metropolitan authorities, informing them that the referees have fixed the maximum amount of sulphur to be allowed after September next, at 30 grains in 100 feet.

Correspondence.

THE COLLECTION OF GAS ACCOUNTS.

SIR,—After a good many years experience in gas matters, and for the last twelve professionally engaged as concurrent auditor to a provincial company of old standing (1818), I am disposed to offer an opinion on Mr. Jones's method of collecting accounts; and, further, to say that his system I should not recommend.

There are no accounts, I believe, brought under an accountant's notice so easy of collection as those of a gas company—admitting that the system of book-keeping is the proper system, and strict regularity has been observed in getting in outstanding moneys.

In the first place the ordinary course of trading is reversed. If a tradesman dun a customer who does not approve of a too frequent solicitation for his cash, he immediately prefers a new shop. In the matter of gas supply there is no real necessity for dunning, but—to stop the supply. Now, when this is threatened, it implies an open and flagrant disgrace to which no consumer will submit if it be possible to avoid it; hence exertion is made, and the debt discharged.

In the next place, a great many tardy payers are made into good by allowing a discount. For instance, in the works from which I write, the accounts are kept on the quarterly system, and the small consumers who pay their accounts at the office within the months of April, July, October, and January are allowed 6d. per 1000 rebate from the statutory price. Larger consumers get a larger amount. The unpaid accounts are thus reduced to a minimum for the collector, both as to time and number, and I need not say the money is found more useful in the house than lying on the ledgers. Those who do not take advantage of this arrangement are known not to be fast in their payments, and therefore no great amount of ceremony need be used towards them, and none is used.

Why a gas company should go out of the usual course of business in consideration to their customers, as mentioned by Mr. Jones, I cannot imagine; we do not find that Mr. Lowe with his income-tax passed by the month of January, or that traders do in a general way.

My experience, then, directs to quarterly accounts and a quarterly collection, with an allowance for discount, as mentioned above. The tabulated method has been tried with us, but we all agreed to return to open ledgers, and the usual routine of book-keeping by day-book, journal, &c.

I think that as many companies, from the high prices of coal, will have to alter their scale of charges from the 1st of July, they will have a good opportunity of adopting the system of rebate under conditions, and which I have known to work so well.

June 27, 1872. F. N. G., *Secretary.*

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JUNE 17, 1872.

The KEIGHLEY WATER Bill.—The House was informed that the opposition to this Bill was withdrawn.

The HAWORTH LOCAL BOARD OF HEALTH Bill was read a second time, and committed.

The TAMWORTH GAS Bill was returned from the Commons agreed to, with amendments.

A petition was deposited against the BURY IMPROVEMENT AND WATER Bill, from James Rawstron.

GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill.—Amendment reported.

TUESDAY, JUNE 18.

The HINDLEY LOCAL BOARD (No. 2) Bill; the BRIDPORT WATER Bill; and the KEIGHLEY WATER Bill, were reported, with amendments.

TAMWORTH GAS Bill.—The Commons amendments were considered, and agreed to.

The CARNARVON CONSUMERS GAS Bill was returned from the Commons, with the amendments agreed to.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill was read a third time (according to order), with the amendment, passed, and sent to the Commons.

The LYMM LOCAL BOARD GAS Bill was read a third time, with the amendments, passed, and sent to the Commons.

THURSDAY, JUNE 20.

The BRIGHTON CORPORATION WATER Bill was reported, with amendments.

The LOCAL GOVERNMENT SUPPLEMENTAL (No. 2) AND ACT (No. 2, 1864) AMENDMENT Bill was referred to a Select Committee.

FRIDAY, JUNE 21.

The HINDLEY LOCAL BOARD (No. 2) Bill, and the BRIDPORT WATER Bill, were read a third time, with the amendments, passed, and sent to the Commons.

LOCAL GOVERNMENT SUPPLEMENTAL (No. 2) AND ACT (No. 2, 1864) AMENDMENT Bill.—The House was informed that the opposition to the bill was withdrawn; it was therefore referred to a committee of the whole House.

The NEWTOWN WATER Bill was returned from the Commons, agreed to, with amendments. The said amendments considered and agreed to.

MONDAY, JUNE 24.

The BOLTON CORPORATION Bill, and the BRIGHTON CORPORATION WATER Bill, were read a third time, with the amendments, passed, and sent to the Commons.

TUESDAY, JUNE 25.

The WARWICK LOCAL BOARD WATER Bill was reported, with amendments.

The GAS AND WATER ORDERS CONFIRMATION (No. 2) Bill; GAS AND WATER ORDERS CONFIRMATION Bill; and the LYMM LOCAL BOARD GAS Bill, were returned from the Commons, with the amendments agreed to.

The BIRSTAL LOCAL BOARD Bill was returned from the Commons, agreed to, with amendments. The said amendments considered, and agreed to.

THURSDAY, JUNE 27.

The following Bills received the Royal Assent:—GAS AND WATER ORDERS CONFIRMATION; GAS AND WATER ORDERS CONFIRMATION (No. 2); ABERYSTWITH IMPROVEMENT WATER, &c.; MANCHESTER CORPORATION WATER, &c.; ILFRACOMBE GAS; DARLINGTON BOROUGH SEWAGE IRRIGATION; NEWPORT AND PILLGWENLLY WATER; WILMSLOW AND ALDERLEY EDGE GAS; ALTRINCHAM GAS; TAMWORTH GAS; CARNARVON CONSUMERS GAS; NEWTOWN WATER; BIRSTAL LOCAL BOARD; and LYMM LOCAL BOARD.

FRIDAY, JUNE 28

The HAWORTH LOCAL BOARD OF HEALTH Bill, and the BARROW-IN-FURNESS CORPORTION Bill, were reported, with amendments.

The BOLTON CORPORATION; BRIDPORT WATER; and HINDLEY LOCAL BOARD (No. 2) Bills, were returned from the Commons, with the amendments agreed to.

HOUSE OF COMMONS.

MONDAY, JUNE 17, 1872.

CARNARVON CONSUMERS GAS Bill.—The Lords amendments were agreed to.

The NEWTOWN WATER Bill, as amended, was considered.

TUESDAY, JUNE 18.

The BIRMINGHAM SEWERAGE Bill.—It was proposed and agreed to, by 148 against 145, that the third reading be put off for three months.

WEDNESDAY, JUNE 19.

The BIRSTAL LOCAL BOARD Bill, as amended, was considered.

THURSDAY, JUNE 20.

The NEWTOWN WATER Bill was read a third time, and passed, with amendments.

MONDAY, JUNE 24.

The FIRSTAL LOCAL BOARD Bill was read a third time, and passed, with amendments.

TUESDAY, JUNE 25.

The LYMM LOCAL BOARD GAS Bill.—The Lords amendments were agreed to.

WEDNESDAY, JUNE 26.

The DARLINGTON IMPROVEMENT, and the HEREFORD IMPROVEMENT Bills, were reported, with amendments.

THURSDAY, JUNE 27.

The BOLTON CORPORATION; BRIDPORT WATER; and HINDLEY LOCAL BOARD (No. 2) Bills.—The Lords amendments were agreed to.

DEARTH OF WATER IN BERMONDSEY AND ROTHERHITHE.

Mr. KAY SHUTTLEWORTH asked the President of the Board of Trade what information he had obtained as to the dearth of water in two large districts of London—Bermondsey and Rotherhithe—supplied by one of the metropolitan water companies, and what steps were being taken by the Board of Trade and by the water company to avert the dangers to health which would result from a continued deficiency in the water supply.

Mr. CHICHESTER FORTESCUE: In answer to my honourable friend, what I have to say is that the first intimation which the Board of Trade received of this deficiency of water at Bermondsey was from the report of the proceedings of the vestry in the public press. The Board of Trade immediately wrote to the vestry-clerk, and, on ascertaining that the report was true, I should, on the same day, have sent an inspector to inquire, if I had had power to do so; but I found, on reference to the Metropolitan Water Act of last year, that we had power to appoint an inspector to inquire as to the quality, but not as to the quantity of water, and in this case there was no question of quality, for there was no water at all. (Laughter.) I found, however, that under a previous Act, passed, I think, in 1852, the Board of Trade has power to inquire into the quality and quantity of water, not *proprio motu*, but upon requisition from a certain number of ratepayers. We informed the vestry of this, and received the necessary memorial, and we sent an inspector, who is making inquiries this day, and I hope to-morrow to be able to give a full answer to the question of my honourable friend.

Mr. KAY SHUTTLEWORTH asked the President of the Local Government Board what powers the board possess of seeing that the necessary precautions are taken by the sanitary authorities of Bermondsey and Rotherhithe to prevent the use, during the present dearth of water supply, of water from surface wells and other dangerous sources, and, if the Local Government Board has not such powers, whether any department is charged with them; and further, whether any department is responsible for seeing that the local authorities in London perform their duties for the protection of the public health.

Mr. STANSFELD: Neither the Local Government Board nor, as far as I am aware, any other Government department, possess the power to prevent the use of water from surface wells, or pumps, or other dangerous sources, either in the metropolis or elsewhere. With reference to the latter part of the question, no Government department is authorized to exercise a general supervision in that respect, but under the Metropolis Management Act of 1858 the Secretary of State may, at the request of the local authorities, direct proceedings to abate the nuisance. He may make an order on the local authorities, and call on them to enforce the same.

Mr. KAY SHUTTLEWORTH: I give notice that before we go into committee on the Public Health Bill, I shall ask my right honourable friend whether he proposes to ask for further powers to be vested in any department on that subject.

FRIDAY, JUNE 28.

The BRIGHTON CORPORATION WATER BILL.—The Lords amendments were agreed to.

The NOTTINGHAM AND LEEN DISTRICT SEWERAGE Bill was reported, with amendments.

THE SCARCITY OF WATER IN BERMONDSEY AND ROTHERHITHE.

Mr. KAY SHUTTLEWORTH asked the President of the Board of Trade what information he had obtained as to the dearth of water in Bermondsey and Rotherhithe, supplied by one of the metropolitan water companies, and what steps are being taken by the Board of Trade, and by the water company, to avert the dangers to health which would result from a continued deficiency in the water supply.

Mr. CHICHESTER FORTESCUE: I have received this morning the report of the Board of Trade inspector on this subject. It comes to this—that the complaints of a deficiency of water supply in Bermondsey and Rotherhithe were well founded, and that for several days the deficiency was of a serious character, there being a great want of water; that the immediate cause of this deficiency was the choking of the filtering-beds with weeds; but that the real cause was that there was not a sufficient head or store of water at the company's works. Another cause which contributed to the evil was the defective fittings in the poorer houses of the district itself. The water company have stated that they are taking the means best calculated to avert danger to the water supply in future, by executing at a large cost some very important works, including a large reservoir at Nunhead. At the present moment the supply of the district is very ample, but I am bound to add that what has occurred ought to induce the water company to hurry on the requisite improvements.

PUBLIC HEALTH HILL.

In answer to Mr. RYLANDS, who asked whether it was the intention of the Government to proceed with this bill during the present session,

Mr. STANSFELD said it certainly was the intention of the Government to proceed with the bill. His honourable friend and the House were aware that he committed the bill *pro formâ* last night, with the view of moving certain amendments and omitting certain clauses. However unwillingly, he had been obliged to come to the conclusion, considering the advanced period of the session and the pressure of public business, that it was necessary, in the interest of the bill itself, to do what was sometimes called "throwing part of the cargo overboard." He had considered what sacrifices it would be requisite to make in order to ensure the passing of a measure which it would be worth the while of Parliament to pass. Last year, he might remind the House, they consolidated certain departments of the local board. Most members were aware that the bill upon the table might be divided into three parts—the first part organizing local sanitary authorities; the second, which was the body of the bill, giving new powers to those authorities, and imposing new duties upon them; and the third part containing a number of miscellaneous clauses, some important, some merely conferring facilities for procedure upon the local authorities. The best course to take appeared to be this—to rest satisfied for the present with the consolidation and concentration of the local authorities, and to withdraw the clauses with reference to nuisances, hospitals, rivers, and other matters, thus making it a bill for constituting the new sanitary authorities and giving them some facilities.

Mr. CORRANCE asked the right honourable gentleman whether he could name a day for bringing on the bill?

Mr. STANSFELD said it was impossible to name a day until the Mines Bill had been disposed of.

Colonel BARTTELOT asked whether any determination had been come to as to the expenses in connexion with the bill.

Sir H. SELWIN-IBBETSON asked whether, when the Mines Bill had been disposed of, precedence would be given to the Public Health Bill in preference to the Licensing Bill.

Mr. STANSFELD said the Government were not yet in a position to fix a day for bringing on the bill, but would take the earliest opportunity of giving the best possible notice.

Legal Intelligence.

COURT OF EXCHEQUER.—WEDNESDAY, JUNE 26.

(*Sittings in Banco: before Barons* BRAMWELL *and* CHANNELL.)

SHEFFIELD WATER-WORKS COMPANY *v.* BENNETT.

Mr. FIELD, Q.C., Mr. KEMPLAY, Q.C., and Mr. BARKER, appeared for the company; and Mr. MANISTY, Q C., and Mr. CAVE for the defendant.

This case was argued a few days ago before Barons Bramwell and Cleasby, and judgment was reserved by their lordships.

The question involved in the case was how much the plaintiffs were entitled to charge the defendant for water-rates. The plaintiffs contend that the word "rent" in their special Act of Parliament meant the sum actually paid by the occupier for rent, and for which he could distrain. The argument for the defendant was that the word "rent" meant the annual value of the tenement, and in ascertaining that he was entitled to deduct from the gross amount which he received from his tenants the sum which he paid in respect of the tenements for poor-rate, district-rate, and also water-rate, where the annual rental of the tenement was under £10.

Baron BRAMWELL, in delivering judgment, said: In this case, the Sheffield Water-Works Company against Bennett, which was argued before my brother Cleasby and myself, I now deliver our judgment. It was an action by the plaintiffs for the recovery of a water-rate, or rent, from the defendant, who was the owner of many small houses in Sheffield, and the question was whether the plaintiffs were entitled to charge on the rent paid—that is, the sum paid by the tenant to the landlord for the right to occupy premises without deduction, or whether the landlord paying the water-rate, or rent, was entitled to deduct from the amount the poor-rate, the district-rate, and the water-rate itself. On the part of the plaintiffs it was said the defendant had no right to deduct these items or any of them. Now, what the plaintiffs strongly relied upon were the words of their private Act in section 79. The company are required to furnish a sufficient supply of water to any one occupying a private dwelling-house, or part of a dwelling-house, at the following rates per annum—*i.e.*, where the rent does not amount to £7 per annum so much, and then it goes on giving various amounts. In section 80 it is provided that in cases where landlords or owners of a number of houses let them at rents not exceeding £7 a year they might agree with the company to pay the rates themselves. The plaintiffs contend that what is commonly called rent was the sum on which the water-rate was to be calculated according to this Act of Parliament, and that no mention was made of any abatement from it; and the consequence would be that the company ought to be paid what the occupier paid the landlord. It was said further, that this was the best way of ascertaining the amount to be paid, and that if you once go into a discussion of what the true rent was it would be a thing almost impossible to settle; as, for instance, the landlord would say, "I don't receive as much rent in reality for these premises as my neighbour does; mine are dilapidated, and large sums go to keep them in repair." And it was said in answer to that argument, on the part of the defendant, you cannot always look to the rent for reasons that I shall mention presently. Plaintiffs further argued that the rent paid was the value of the premises to the occupier, because the landlord, having to pay them instead of the occupier, the premises became of so much greater value to the occupier. And it was urged on the part of the plaintiffs, with respect to this very water-rate, that it was as though the landlord had laid a conduit from a river and made the premises more valuable to the occupier. No doubt that argument was entitled to considerable weight. On the other hand the defendant argued that it was impossible the word rent could be looked at as having that application, and he called attention to this, that the rent was always spoken of as a rent that did not amount to £7 per annum, so that if you look at it literally you knew that the cases of rent from week to week, or from month to month, were not provided for. The defendant further contended that there were cases where you could not look at the rent as in the case of a man occupying his own house. Again, the case where a man occupied a furnished house, and paid a sum for the occupation of the house and the use of the furniture; and again, there were cases where a man might pay what is commonly called ground-rent—that is to say, a man might rent a piece of ground and bui'd a house upon it, and pay only for the rent of the land. Therefore, the defendant argued with great force that it was impossible you can look at the amount of rent as having that effect and force which the plaintiffs desire to attribute to it. As to the argument that you get into difficulties if you make the deduction, the defendant said—Not at all; if instead of the word rent "annual value" had been used all these difficulties would exist, and substantially you would not have gained anything. What you have got to do is to ascertain, if the word rent is used, what is the rent of the premises as distinguished from adventitious advantages which the premises may by chance enjoy. I am not going to give a definition of "rent," either to satisfy political economists or to meet all possible cases. Everybody understands pretty well what it is. It is that sum which a tenant pays to the landlord for the privilege—for the right—of occupying premises in a normal state, without anything of what can be called freehold advantages—as I have said before, any adventitious or abnormal advantages of water-rates or poor-rates being paid for him. Therefore the defendant said there was no authority for construing the Act of Parliament as the plaintiffs had construed it. Then came this observation on the part of the defendant. At the time that this water company's Act of Parliament passed there would have been a right to charge, and of course various Acts of Parliament that have since passed do appear to make him liable for the rate under that Act, but that was never put in force. At the time that this water company's Act passed the tenant paid all the tenant's rates. The obvious consequence of putting them on the landlords is to raise the rent—or what is called rent—the sum the tenant pays for the occupation of the house. It is perfectly manifest if a man goes to a house for which he is not going to pay rates, he will pay more for it than if he paid the rates. Therefore the argument on the part of the defendant was, that if the plaintiffs are right in their construction the result of putting on the landlord the district-rate, and the poor-rate and the water-rate is to increase the annual rent paid to the landlord, and consequently increase the sum which the occupier of the premises might be charged for the water-rate; and therefore, the effect of these Acts of Parliament would be to add 10 per cent. to the water-rates of the people of Sheffield. It was also pointed out that there might be this case: There are two houses of precisely equal value. A man owns both. He occupies one, which is worth £9 a year, and is only liable to be rated at £9. He lets the other, and he pays the district-rate, the water-rate, and the poor-rate upon it, and he would [be liable] to be rated at £10 or upwards. The result would be that in respect of the house he himself occu-

pied he would be liable to be charged one rate for water, and in respect of the neighbouring house he would be liable to be charged another rate for water. There cannot be in reason any explanation of that. Another thing also would follow. I will take the figure I mentioned. As soon as the landlord has paid the rates for his house, the rent becomes upwards of £10 a year. It may be that the illustration ought to be limited to £7, but I am not going into any entanglements. Taking the £7 or £10 to be the criterion, he will, when he pays the district-rate and the poor-rate, raise the rent above the statutory amount, and the consequence is he will not be under the obligation to pay the water-rate. On the other hand, if the tenant pays the rate, the rent may go down below the amount, and then the landlord would be under the obligation to pay. The consequence is, in certain houses which come within the Act of Parliament, the landlord must pay the water-rate. As I have said before, the defendant says this is really no part of the rent; it is not part of the annual value of the premises. There is no use in likening it to the case of a well or conduit from a stream. It cannot be taken in the annual value of the premises. It is no more a part of the freehold than the gas supplied for the purpose of light, or, what is perfectly possible, the supply of warm air. Suppose this case included what might arise in the manufacturing districts. A man had several houses near his manufactory, and he supplies warm air so as to save the expense of coal. He might charge an additional "rent." Or you may have what we know is done—steam power laid on. Take all these cases. It would be unreasonable to say that this contributed to the rent or normal value of the house. It is a matter between the landlord and the tenant. It is impossible to suppose under these circumstances, for the purposes of this Act of Parliament, that it enables the water company to charge the sum so payable. This was the argument in the main on the part of the defendant, and I own it has prevailed with me. I cannot think there is much difficulty in the case. No doubt the word rent is used in the Act of Parliament, but it strictly would exclude perhaps the most numerous class of cases. It means value—viz., the sum paid for a house in its normal state. It cannot be said that this is part of that for which a tenant pays, consequently our judgment will be for the defendant.

Baron Cleasby's judgment, which was read by Baron BRAMWELL, was as follows:—In this case the question for consideration is, what is the proper meaning to be given to the word "rent" in the 79th section of the Sheffield Water-Works Act, 1853. According to that section houses are to pay water-rates upon a different scale according to the rents of the houses; not in exact proportion to the rents, but going by steps. For example: if the rent shall not amount to £7 per annum, then at a rate for the whole year not exceeding 6 per cent. on such rent; if the rent exceeds £7, but not £8, then at a rate not exceeding 8s., and so upon a varying scale; and if the rent amounts to £100 per annum the rate is not to exceed 3 per cent. upon such rent. By the Water-Works Consolidation Act, 10th and 11th Vic., cap. 17, sec. 68, water-rates are to be payable according to the annual value of the premises, and this Act is only incorporated with the Sheffield Act, where the provisions of the latter do not vary the former; and as the standard of rating is different, the 68th section is not so entirely applicable as to justify us in saying that the effect of the two Acts is that annual value mentioned in the 68th section and the rent mentioned in the 79th section of the special Act must mean the same thing. It should be noticed that in the earlier Sheffield Water-Works Act, 2nd Geo. IV., cap. 55, sec. 93, the water-rates were payable according to the rent taken by certain steps in a similar manner, though not exactly the same, as in the present Act. But this Act is repealed, and is only adverted to on account of the general provision in section 92, "That the rate shall be payable according to the actual amount of the rent where it can be ascertained, and where it cannot be ascertained, then according to such rent as such inhabitant shall be assessed for the house-tax." Now, when we refer to the Act for assessing the house-tax, 48 Geo. III., c. 55, and to the schedule B, we find that the assessment is at certain rates, where the houses shall be worth the rents after-mentioned, and then follows the scale of rents and the assessment in the pound. This, though not forming part of the Act in question, is well worthy of notice as showing the use of the word rent, as signifying the rent which a house is worth, which is in other words the yearly rent or value. For although the actual rent is to be the guide when it can be ascertained, this must mean the actual rent when it represents the value, not where from other conditions under which it is paid as rent it is no criterion of value at all. And the same reasoning, we think, applies to the Act in question. The word "rent" cannot signify strictly the rent actually or accidentally paid. In a row of houses, all of equal value, one might be let at a nominal rent from love and affection, another might be let at a greatly reduced rent to a servant in the employ of the landlord, another might yield a small rent because the tenant had repaired the house himself or paid a premium, and no one would contend that in any such cases the actual rent would be the criterion. It would not be the criterion in any case in which it does not form a means of comparison with other houses as the house is worth, and is the real criterion of value as distinguished from estimates. It makes a fact the test, which is certain, and excludes partiality. Having arrived at the conclusion that the actual rent is not necessarily the rent referred to in the 79th section, but the proper rent for the houses which would in general correspond with the actual rent of small houses let at weekly rents, it follows as we think that the proper rent must be ascertained by some regular and fixed standard, and not by a standard depending upon whether the house is let or occupied by the owner or let for more or less than three months or of a greater or less value than a particular sum, or upon the application of certain Acts of Parliament to the property or upon the particular arrangement made between the landlord and tenants. Now, upon proper construction of the 79th section standing by itself, supposing no subsequent Act of Parliament on the subject of rating to be applied to the premises, the rent paid by an ordinary tenant, who himself paid all the rates—charges always properly borne by occupiers—would clearly satisfy the word "rent." It may appear that this would be so only as regards houses above the annual value of £10, because as regards houses below that value, by the 72nd section of the general Act the owners of such houses are liable to the water-rate instead of the occupier, so as to make the water-rate necessarily as regards such houses part of the rent, but this is an apparent objection only. It would be an objection if the word "rent" in the clause in question must signify the rent which the tenant pays, whereas the more reasonable meaning is what rent the premises are worth as rent under ordinary conditions. The word "rent" may, we think, be read to mean what the landlord gets as rent under the usual conditions, though technically this is not its meaning, and if the landlord is obliged to pay the water-rate all that he gets as rent, and all that ought to be taxed as rent, is the whole payment after deducting what he is obliged to pay. The same reason applies with equal force to the payment for poor-rates and district-rates. We thus hold the word "rent" in the 79th section to mean the proper rent to a tenant paying the rates and charges regularly paid by the tenant, of which the actual rent, when the tenant does pay those rates and charges, is in general the proper criterion, and this is the same thing as the yearly worth or annual value. And by so holding we escape from the inconsistency of rating the premises upon a different stand, and according as the value of the premises makes the actual payment of the rates fall upon the tenant or landlord. The words "rent" and annual value are often used indiscriminately, and they are so used in the 68th section of the general Act, and the 79th section of the special Act. As another instance, although it is not allowed to refer to the marginal references in construing the clause in an Act of Parliament, yet one may do so in considering the general sense in which the words are used, and the 72nd section of the Water-Works Commissioners Act makes the rate payable by the landlord when the annual value of the premises does not exceed £10. The marginal note is, "Owners of houses not exceeding £10 rent to be liable to the rates." We have referred to the various authorities cited in the course of the argument. We do not think the settlement cases have any real bearing upon a case like the present where we are considering a system of rating houses. But it may be noticed that it would appear that the case of *Rex v. St. Paul, Deptford*, 13 East, was decided because the court felt bound by a previous decision in *Rex v. Framlingham* Burrows's Settlement Cases; and as regards *Rex v. Thurmaston*, the Act of Parliament required that one of the houses must be *bonâ fide* hired for £10 by the year, and the rent paid for one year, and as to the other that the house must be rated at £10 a year, and the rent actually paid for that term. So that the payment by the tenant of the rent of £10 for one year is the criterion of settlement, a reason which does not apply to the present case at all. The case of *Kelstone and Rose*, 38 L. J., Q. B., p. 6, raised a question as to the jurisdiction of the county court judge, and the grounds of decision do not at all assist the decision in the present case. In *Regina v. Bilston*, L.R., 1 C.B. 18, a poor-rate case, it was held that the water-rate ought not to be deducted from the amount, £11 5s., found as a fact by the sessions to be the gross rental, on the ground that it did not come within any of the deductions allowable under the Parochial Assessment Act, 6 and 7 Vic., c. 96, sec. 1. In that case there was nothing in the nature of a water-rate, but the water was supplied at the option of the inhabitants, and the assessment paid by landlord or tenant as arranged between them. The court held it clear, and could not do otherwise, that the water-rate was not a tenant's rate, and that it did not come within the other head of deductions as an expense necessary to maintain the premises in a state to command the rent any more than the supply by agreement of meat or any other necessary of life had done so. That case, therefore, has no bearing upon the question in that present case. In the present case all the deductions claimed are in respect of charges which are the subject of rates and necessary so far as the property is concerned. But the case mainly relied upon by the plaintiffs was that of *Rooks appellant, and Mayor of Liverpool respondent*, 7 C.B. (U.S.), 240. According to the marginal note that case would be a strong authority in their favour, and if the question raised in the case and decided had not been complicated by an agreement between the parties which was relied on in the judgments, and, in fact, formed the foundation of them, we should have felt bound by the decision upon the question of such a general nature as rating, and decided accordingly. In that case the water-rate was to be upon the annual value of the premises, and there was a power to compound where the yearly rent or value did not amount to £13. There had been a composition paper by which the appellant agreed to compound for the water-rates, and in a schedule the *rental* of the two sets of premises was stated to be 4s. 6d. and 3s. 6d. per week respectively, and there was a proviso that in case the rentals were not correctly stated, the coporation might insert the correct rentals and recover the water-rates accordingly. It appeared that, in fact, the rentals were 6d. a week more in respect of both rents of premises, the landlord claiming to deduct the 6d. for the rates paid by him. The court held that in that case the appellant must be rated to the full amount, but not, it is submitted, because that would be the correct mode of rating independent of the terms of the composition, but because the appellant had agreed to make the actual rental the criterion, or rather the corporation had a right to act upon his having so agreed. Erle, C. J., in the course of the argument, says, p. 257,—"You say that the written contract between the parties is on the rental and with a view to that alone, and that for aught that appears the counsel would not have entered into it upon any other footing," and the whole of his judgment afterwards given is to the same effect. The conclusion of it is, "My judgment is upon the terms of the composition paper which is before us." Mr. Justice Willes says: "It seems to have been agreed on both sides that the rent should be taken to represent the value." So that no judgment whatever is given upon the general question of annual value, but only upon the proper construction of the composition paper. There is no such question before us now, and therefore the decision does not in any way conflict with the reasons which we have given for the conclusions arrived at. For the reasons above given we think that in determining the class to which the houses belong, the actual rent paid by the tenant is not to be taken, but the sum which comes into the landlord's pocket as rent after the deductions for water-rates, poor-rates, and district-rates, wherever he pays them. The same question arises in the case of *Bennett v. The Sheffield Water Works*, stated by the magistrate, and according to our judgment already given the decision is that the case will be reversed.

Judgment for the defendant accordingly.

THE STRIKE AMONG GAS-TUBE MAKERS AT DUDLEY.—An adjourned meeting of the men lately employed by Mrs. Skidmore, of Netherton, and now on strike for a reduction of working hours to nine per day, was held on the 26th ult., near the works. It was stated by one speaker that, with the exception of Mrs. Skidmore and a firm at Birmingham, the whole of the gas-tube trade gave their men the boon desired. It was unanimously agreed that the men should continue the strike until the nine hours system was adopted in the factory. It was stated that Mrs. Skidmore had offered the men 10 per cent. increase on their prices without the reduced hours, but this was declined. It was also resolved unanimously, that the societies which had helped to support the men should be heartily thanked.

NON-PAYMENT OF A GAS AND WATER ACCOUNT.—At the Canterbury Petty Sessions, on June 24, Mr. Frederick Hagel, a confectioner, of Burgate Street, was summoned for the non-payment of the sum of £4 17s. 2d., the amount of a charge for gas and water supplied by the company. The defence was that he was not charged fairly for the water in proportion to the rating of his house. He was rated at £14, and was charged for water at the rate of £30. Mr. Burch, clerk to the company, said Mr. Hagel stood in the rate-book as rated at £30. He might say that the company were not bound to make their charges on the amount of the rate, but did so in order not to have any trouble with their customers. Mr. T. S. Cooper (magistrate) said the remedy was in the hands of Mr. Hagel to cut off the connexion with the company. Mr. Burch said the company believed Mr. Hagel's property was connected with an adjoining slaughterhouse occupied by Mr. Cornes. Mr. Cornes, however, explained the division of the two properties. Mr. Cooper decided that the amount must be paid, and that defendant must get himself put right in the rate-book.

PROPOSED SALE OF THE DUMFRIES GAS-WORKS.—THE POLICE COMMISSION AND THE GAS COMPANY.—A special meeting of the Dumfries Police Commission was held on the 20th ult.—Provost Harkness presiding—to consider the report of Mr. B. M. M'Crae, Dundee, as to taking over the gas-works from the present company. The town-clerk read Mr. M'Crae's report, which contained the following valuations:—Lands and buildings, £7480; gas apparatus, £3844; main the ewer pipes, £5435; meters (say), £987—total, £17,746. This sum was the fair and full value of the works as they now stood, and he recommended the commission to offer it to the company for their works, but did not advise that any higher sum be given. Mr. Wood moved the adoption of the report, and that a remit be made to the sub-committee, with powers to negotiate with the gas-company. Bailie Smith seconded the motion. Mr. Lloyd moved, and Mr. Johnstone seconded, that consideration of the matter be deferred till the ordinary meeting on the first Friday of July. On a division, Mr. Wood's motion was carried by 13 to 9, and a remit made to he sub-committee in accordance therewith.

Miscellaneous News.

BOMBAY GAS COMPANY.

The Half-yearly Meeting of the Shareholders of this Company was held at the City Terminus Hotel, Cannon Street, London, on Thursday, June 27; DANIEL THOMAS EVANS, Esq., in the chair.

The SECRETARY (Mr. Marshall) having read the notice convening the meeting, and the minutes of the last ordinary and special meetings, the corporate seal was affixed to the register of shareholders.

The following report and statements of account having been previously circulated among the shareholders, were taken as read:—

Your directors have pleasure in meeting the shareholders, and presenting a statement of accounts for the half year ending the 31st of December last, duly audited.

Owing to the new contract with the municipality having come into operation, there has been, compared with the corresponding half of the previous year, a steady though not large increase in the consumption of gas.

The extention of mains (11 miles) and the erection of new public lights (476) under the new contract have been completed, and it is working satisfactorily.

The municipality have settled all outstanding arrears, with interest.

The net profit for the half year is £9683 7s. 8d.

Your directors have added to the reserve-fund £1500 for the half year, making a total of £3110 19s. 9d. in the year, and they have written off from the reserve-fund for depreciation £952 18s. 2d. in the half year, making a total of £1895 2s. 6d. in the year.

The general revenue account, after payment of the interim dividend of 3½ per cent. on the 1st of January last, shows a balance of £9881 19s. 3d. Out of this your directors recommend the shareholders to declare a divided of 3½ per cent., making 7 per cent. for the year, free of income-tax, and payable on the 1st of July next. This will absorb £9000, and leave £881 19s. 3d. to be carried forward to next half year.

The directors who retire by rotation are Charles Frederick Collier and Henry Palfrey Stephenson, who, being eligible, offer themselves for re-election.

General Balance-Sheet, Dec. 31, 1871.

Dr.				*Cr.*			
To Capital authorized:— (50,000 shares, at £5 each—£250,000.)				By Construction account			£198,133 0 2
40,000 shares, £5 paid	£200,000	0	0	Amount owing to the company			11,390 16 0
10,000 „ £4 paid	40,000	0	0	Goods *in transitu*			916 4 2
	£240,000	0	0	Stock in trade, viz.:—			
Amount owing by the company	10,881	19	9	Chandeliers, brackets, &c.	8,403	17	7
Debentures	5,000	0	0	Brass and iron goods, tubing, &c.	10,667	7	9
Dividend	7,800	0	0	New works, materials, mains, and services	2,505	17	2
Reserve-fund	3,517	8	9	Meters	6,028	16	3
Added this half year	1,500	0	0	Coal	26,869	3	6
	5,017	8	9	Coke	16	19	9
Written off brass and iron goods, tubing, tools, meters, services, &c.	952	18	2	Tar	1,339	6	8
	4,064	10	7	Oxide, tools, fire materials, &c.	1,712	15	0
Insurance-fund	393	2	10	Services account	110	18	4
Passage-fund	84	15	6	Retort account	630	0	0
Balance to general revenue account	9,881	19	3	Cash at bankers and in hand	£6,346	6	7
				Bills receivable	3,000	0	0
					9,346	6	7
	£278,106	7	11		£278,106	7	11

Profit and Loss Account, Dec. 31, 1871.

Dr.				*Cr.*			
To Coal carbonized	£6,990	4	2	By Gas and meter rental	£19,697	11	7
Wages	1,367	7	0	Coke	2,459	12	2
Purifying	37	0	6	Tar	382	11	3
Maintenance of retorts	130	0	3	Transfer fees, &c.	14	8	9
Trade and general charges	1,380	16	0				
Salaries and collectors commission	1,785	15	6				
Rents, rates, and taxes	405	19	8				
Law expenses	53	10	11				
Directors and auditors remuneration	601	5	0				
Bad debt account	11	2	11				
Exchange and interest	307	14	8				
Net profit	9,683	7	8				
	£22,754	3	9		£22,754	3	9

General Revenue Account, Dec. 31, 1871.

Dr.				*Cr.*			
To Dividend for the half year ending June 30, 1871	£7,800	0	0	By Balance June 30, 1871	£9,498	11	7
Amount carried to reserve-fund	1,500	0	0	Net profit for the half year ending Dec. 31, 1871	9,683	7	8
Balance carried down	9,881	19	3		£19,181	19	3
	£19,181	19	3	Jan. 1, 1872.—Balance brought down	£9,881	19	3

The CHAIRMAN: Gentlemen, I have now to move the adoption of the report and accounts. The report has put you in possession of the material facts bearing on the interests of the company to the present time, and I think upon the whole they will be considered not unsatisfactory. You will observe from the statement of accounts that the directors are enabled to recommend you to declare a larger dividend than has been hitherto declared. This is the more gratifying because it is accomplished in face of the fact that we have reduced the price of gas to private consumers 1s. per 1000 cubic feet, and we have supplied a larger quantity of gas to the municipality for public lights at a reduced price. I have to ask your attention to the circumstances which have placed us in the position of being able to pay a larger dividend on this occasion. From time to time during the last three or four years, I have had the pleasure of informing you that the cost of production was decreasing, while the yield of gas per ton of coals was increasing. I am happy to repeat that this holds good in reference to the six months under review. The cost of our coals, put into the retorts, in the period under review, has been £2 0s. 11d. per ton, as compared with £2 3s. 6d. for the corresponding period of last year. The yield of gas per ton of coal has been 9631 cubic feet as against 9130 cubic feet. The total quantity of gas made has been 32,920,000, as contrasted with 31,126,000, which was the quantity made in the six months ending December, 1870, showing an increase of 1,794,000 cubic feet. The gas sold in the last six months of 1871 was 30,523,800 cubic feet, as contrasted with 28,852,900 cubic feet sold during the corresponding period of 1870, being an increase of 1,670,900 cubic feet. With reference to the leakage, you will remember that at one time it reached an alarming point, and in 1870 it was no less than 14 per cent. I am happy to say that during the last six months it was reduced to 7½ per cent., a reduction chiefly due to the completion of our main laying. I have also to assure you that the state of our works and apparatus is most satisfactory. I will read to you a few lines from a very able and comprehensive report furnished by our excellent and able resident engineer, Mr. Gandon. It is dated May 20. He says: "Generally the whole of the apparatus is in efficient working order, and, with the exception of the effects of ordinary wear and tear, which are remedied by current repairs, every part of the works is in good condition." I think it will also be satisfactory if I read to you what he says as to the state of our mains. You will remember that we have laid in Bombay between 60 and 70 miles of mains. Mr. Gandon says: "During the recent extension of mains and relaying of services, I have had many opportunities of examining the old mains, and in every instance found them in excellent condition; many, in fact, appearing as good as when laid. The joints appear to have been soundly made, and, generally, great care has been taken in the laying." For this satisfactory state of the mains the company are largely indebted to their former manager, Mr. Whittle, who was laid aside by ill-health, and subsequently to Mr. Prond. With reference to the services, Mr. Gandon says: "The soil of Bombay being in many places impregnated with salt, has an injurious effect upon the wrought-iron services; many of which had become so much decayed, that considerable loss took place through them. About 600 of the oldest and longest services have recently been relaid, and observations taken from a meter on the works at the outlet main prove that a considerable reduction has been effected in the leakage. The service relaying is still being carried on. Where wrought-iron pipe is used, it is well bedded in tar and ashes to lessen the destructive effects of the soil." I may also read to you further what he says respecting the public lighting: "During the year 1871, 11 miles of 3-inch mains were laid to provide for the extension of the public lighting, the number of public lamps being thereby increased from 1750 to 2340. These have been lighted, under the new contract with the municipality, since August last, and the contract being for seven years, is a most important and satisfactory feature in the progress of the company." As you are aware, we were, from the commencement of our works in Bombay, more or less in hot water with the municipality down to the completion of this contract with them. I wish you to have the assurance of this gentleman—our manager at Bombay—as to the present state of our relations with that body. He says: "Our relations with the municipality are of the most amicable nature, the whole of the large arrears has been paid, and there is every prospect of obtaining prompt payment for the future." At our last half-yearly meeting, it was my unpleasant duty to tell you that two acceptances of the municipality in our favour, amounting to £10,000, had been returned dishonoured; but I told you at the same time that you might make your minds easy upon the subject, for the municipality, I felt assured, would pay the bills, together with the interest accruing through their default. That, I am happy to say, they have done. You will remember that we were obliged to issue £15,000 of debentures at our last meeting, owing to the fact that we were very short of working capital, and that we had invested some £26,000 in the purchase of coal. You will presently see, when I come to touch upon that subject, that in laying out so much money for coal we acted judiciously, for it has secured our dividend for two years to come. The £15,000 debentures were all allotted at a small premium at £97, with the exception of the sum of £250, which, being allotted severally in debentures of £50, were inconvenient to the parties, from the smallness of the amounts, and these we agreed to take back again. I now come to the subject of coal. That is one which, I think, forms no ordinary ground for congratulation to the shareholders of this company. If you will only look at the condition of gas companies in London and in England generally at the present time (bearing in mind the fact that the raw material out of which gas is made has more than doubled in price during the last eight or ten months), you will find them in a position of great difficulty, and much embarrassed in their endeavours to maintain their dividends. It was, then, I repeat, a fortunate thing for the company that we took advantage of the low price of freight (although it crippled us for funds at the time), and put into our stock 13,000 tons of coal, when the cost was very much lower than it is at present. At this moment we have two years supply in hand, which we obtained under most favourable conditions. I am told, and I believe the fact is so, that one of the companies in London, in face of their difficulties, have been already compelled to raise the price of gas; and I know that the directors of another large company are almost in a state of panic respecting their supply of coal. It is, therefore, I repeat, a great comfort to us that we took advantage of low prices of coal and freights, to provide for our consumption over a long period of time. On the 31st of December last, we had 13,140 tons, or about two years supply on hand, and we have since that date put in 2500 tons additional. I now come to the subject of fittings. You will see that there is a slight loss (£39) upon fittings. This is due to the circumstance that we were advised by our manager that many of the natives are deterred from taking gas owing to the large cost of fittings; and in order to induce them to come forward more freely we have reduced the price of fittings and labour to an amount which in reality yields us little or no profit. Turning now to the accounts:—In the general balance-sheet you will find that the construction account has been increased during the year from £190,666 to £198,133. The increase is £7467, which is mainly accounted for as follows:—First, there is the purchase-money for the manager's house. I explained to you on a former occasion that we allowed the manager £800 a year for a house. We bought land, and erected a house for him, by which we shall reduce this item of expenditure to about £140 a year, so that you will agree with me this is money well laid out. The amount was £2729. The next item of the increase in construction account is £1679, expended on stores and workshops. There is also included two-thirds of the cost of the main laying, which has been going on for the last 18 months or two years, £2671. This accounts for nearly the whole of the £7467. The "Amount owing to the company," which last year was £11,487, is now £11,390; the item of "Goods *in transitu*," which last year was £2744, is now only £916. At the former period a considerable portion of our mains were on the high seas, and charged in the accounts. The item "Meters" is much the same in amount; but in the item "Coal," there is an increase from £12,223 to £26,869. The cause of this I have fully explained. Coke last year was £481, as against £16 in this account; tar £1424, as against

£1339. At the bottom of the account, the item, "Balance at bankers," shows now a sum of £2180 in our favour. "Bills receivable," which last year stood at £13,590 (which included a large sum due from the municipality and since paid), are now only £3000. On the opposite side the amount owing by the company at the corresponding period of last year was £9839—it is now £10,881. Debentures this year are £5000, and this is the first entry of debentures. The "Dividend" is the same. The reserve fund shows a difference of £1282; and we have written off this year for brass and iron goods, tubing, tools, meters, &c., £952. The "Balance to general revenue account" is less this year by about £100. It was £9931—it is now £9881. If you turn to the profit and loss account you will find (and this is a very important point) that the gas and meter rental at the end of 1870 was £21,159; now it is £19,697, which shows a decrease of £1462. This arises mainly from two causes; it is owing in part to the new contract with the municipality and partly to the reduction of 1s. per 1000 cubic feet to private consumers. It is, furthermore, in part due to economies by the municipality in the lighting of markets, stables, and the police chowkies (stations). The city of Bombay contains some noble markets. The Arthur Crawfurd market is a grand and extensive structure, requiring a great many lamps. For these the municipality paid us on the footing of private lights; but latterly they urged us to allow them to have the lights upon the same terms as we furnished the public lights. We said we were unwilling to do so, and for this reason, that they were in the position of landlords obtaining a rental for the markets; they charge so much for their stalls, and in that charge it was to be presumed they included sufficient to pay for the lighting; and, inasmuch as it is a matter of profit to them, we said we cannot consent to supply gas to their markets in the same terms as we do to the public lamps. "Coke" shows an increase of £25. During the period under review it has realized 36s. 4d. per ton, as against 36s. last year. In the item of "Tar," there is an increase of £267. We have a strong hope that we may hereafter be able to further utilize our tar. There have been some small experiments made with it for paving purposes; it has been used in this way in some "compounds," and we think it may be more extensively employed with advantage. It is not found that the sun has any injurious effect upon it, and it seems to make a really good substantial paving. We have suggested to the municipality, and they are favourable, to have an experiment made upon a large scale, so that we are in hopes we shall ultimately find good use for our tar in this direction. On the other side of the account, "Coal carbonized" shows a decrease on the year of £423, which is in our favour; "Wages" are £43 less; "Purifying materials," £15 less; "Trade and general charges," £216 more; "Salaries and commissions," £145 more; "Rents, rates, and taxes," £312 less; "Law expenses," £8 less; "Directors and auditors remuneration," £125 more, which is justified under the vote of the shareholders at their last year's meeting; "Bad debts," £39 less; "Exchange and interest," £684 less. For the first time for more than three years have we been able to make any profit by exchange. During the last three or four months we have had large remittances, and, with one exception, these have all been in our favour. Heretofore it has been adverse to us to the extent of some £600 a year. The decrease of charges altogether is £1086, as compared with the same period of last year. On the general revenue account I need not say much. The balance of revenue for the last half year was £9683, as against £10,410 at December, 1870, and I have stated the reasons why that decrease has taken place. On the debtor side the dividend for the half year ending June, 1871, was £7800; the amount carried to reserve-fund £1500, and the balance carried down £9881, as contrasted with £9931, which was the balance last year. Now, gentlemen, I have only a few further observations to make. With reference to the private consumption, I must candidly confess that, notwithstanding we have reduced the price of gas 1s. per 1000 cubic feet, we have not found it operate so favourably as we could wish, or as we expected. We have considered the question from every point of view, and we are now trying an experiment which, if successful, we believe will most materially assist us—we are endeavouring to get the gas into the bazaars. From whatever cause—whether from prejudice or cost, or from both together, I scarcely know, though I think probably it may be due to cost—we have not found the class of small natives disposed to take gas. The experiment with the bazaars, so far, seems to promise that we may do something effectual in that direction. I regret now to have to inform you that at our committee meeting, last Tuesday, we received the following telegram from our manager in Bombay:—"Doctors order me to leave the country; appoint successor at once." We received that intelligence with great regret, for Mr. Gandon has been a most able and efficient officer. We are now losing him through his sickness, and I take this opportunity for saying in this place that from first to last he enjoyed and deserved the full confidence of the directors. We found him a man of excellent address (and this was no small recommendation, seeing the arduous negotiations he had to carry through with the Municipality and the Government), with a sound judgment, a practical mind, and a thorough knowledge of his business. We hope he may recover his health in Europe. Fortunately, we have in Bombay a competent assistant manager (Mr. Edinger), and a very able accountant (Mr. Warter), who is charged with all our financial operations, and we feel assured there will be no difficulty in carrying on the business of the company efficiently, although we are losing the services of our present chief officer there. In concluding my remarks, I may say that I think we may look with satisfaction at the past and with confidence to the future of the company. Our progress has not been so rapid as we could wish, but you have the figures before you, and can see it has been safe and steady. The directors have been actuated throughout with a purpose to work the company as economically as is consistent with efficiency, and to promote the consumption of gas by every means in their power. And, doing this, you have to-day the largest dividend yet declared by the company. I now move—"That the report and statement of accounts be received and adopted, and that a dividend for the half year ending the 31st of December last of 3¾ per cent., free of income-tax, be now declared, payable on the 1st of July next."

Mr. COLLIER seconded the motion.

Mr. STOKES said he had been much pleased to listen to the able statements made by the chairman. Although the profits of the last half year's working were not so great, the expenses were less, so that the total result was highly satisfactory. He was delighted to learn that the directors had been able to secure so large a stock of coals. They had exhibited great forethought in the arrangement, and proved that they were thoroughly justified in taking up the loan for which they asked authority at the last meeting. He thought they had acted wisely in reducing the price of gas, and in trying to extend the consumption. If they succeeded in introducing it into the bazaars, the natives would become accustomed to it, and if they once began to use it the consumption would rapidly increase. He heard with regret the chairman's statement respecting the health of the manager, and urged the directors to appoint a successor as soon as possible.

Major GORDON said the assistant manager, with the accountant, conducted the business of the company while Mr. Gandon was in England on a former occasion.

The CHAIRMAN said the appointment of a successor to Mr. Gandon had been discussed at that day's meeting of the directors.

Mr. H. P. STEPHENSON said there was just one little point in the chairman's remarks he should like to touch upon. He (Mr. Stephenson) was a great advocate for the reduction in the price of gas whenever it could be judiciously carried out, and believed it was ultimately the most successful policy. But he was afraid the shareholders would think from the chairman's observations that it had been attended with no advantage in the present instance. The fact was, what the company had done was to increase the discount to consumers for prompt payment to 8 annas, instead of 4 annas, as it had hitherto been—*i.e.*, they gave 1s. off 14s. for prompt payment instead of 6d., which, of course, was a practical reduction. He did not think the directors expected to derive much benefit at the outset, but they felt it was a step in the right direction, and that it would ultimately increase the consumption of gas. With reference to the coal panic, he hoped the shareholders would not feel unduly anxious on the subject. He believed the advance in price of coal, as of iron, was attributable in great part to the demand for these articles on the Continent, in consequence of the coal-fields and iron-works of Germany and France having been thrown out of work during the late war. To a certain extent this had been taken advantage of by English workmen, and to a still greater extent by colliery owners. Looking to the fact that the export of coal for the month of May was less than it was for the corresponding month last year, and that the export of iron was also considerably reduced, taken in connexion with the fact that no orders were coming in for iron shipbuilding, he had a strong opinion that in twelve months time there would be a great reduction in the price of these commodities, though probably they would never be so low again as they had been.

The motion was put and carried unanimously.

On the motion of the CHAIRMAN, seconded by Major SUART, Mr. Collier was re-elected a director.

On the motion of the CHAIRMAN, seconded by Mr. LYSLEY, Mr. Stephenson was re-elected a director.

The retiring auditors, Messrs. Bradley and King, were re-elected, and 25 guineas each was voted for their services in the past year.

The re-elected directors and auditors having returned thanks, it was resolved, on the motion of Mr. STOKES, that the cordial thanks of the meeting be presented to the chairman and directors for their able management of the affairs of the company.

The CHAIRMAN: On behalf of my colleagues and for myself I beg to make our best acknowledgments to you for this expression of approval of our conduct. We shall endeavour also to justify your good opinion in the future.

The proceedings then terminated.

A VISIT TO THE LEICESTER WATER-WORKS.

On Saturday, June 22, the students of the Institution of Civil Engineers accepted the invitation of Thomas Hawksley, Esq., the president, to inspect the new water-works, designed and executed under the direction of that gentleman, for the improved supply of water to the town of Leicester. The party, which was augmented by a large number of visitors, was conveyed from London in special carriages, provided by the president, attached to the morning express on the Midland Railway, reaching Leicester shortly after noon. Conveyances from the Leicester station to the water-works, distant about seven miles, were in waiting in the station yard, and the visitors were thus enabled to reach the works about 1.30 p.m., where they were received by the president and a select party of ladies and gentlemen from the locality. It may be briefly stated that the town of Leicester contains a manufacturing population of 100,000 people. The water-works by which it is now supplied have been constructed on the constant service system, to meet the requirements of at least 160,000 people in years of extreme droughts. They are made in two sections—the older one at Thornton, about nine miles west of the town, and the newer one at Bradgate Park, about seven miles north of the town. They both depend upon rainfall gathered into large impounding reservoirs—the former operating by gravitation whilst the latter requires the aid of pumping machinery. It was to the latter and larger work that the visit was made. In the case of both works, the water is filtered by the most improved method before it enters the main iron conduits by which it is conveyed to its destination. Immediately on their arrival, the students, according to arrangement, separated themselves from the rest of the company, and were placed under the guidance of the secretary of the institute, Mr. Forrest, by whom they were conducted to the south end of the embankment of the reservoir, at which point the president commenced his explanations and description of the several portions of the works. The Bradgate reservoir is about one mile in length, and is at its broadest part nearly half a mile in width. The embankment is between 40 and 50 feet high, and is about 760 yards long. It crosses a beautiful valley at the foot of Bradgate Park, the former residence of the unfortunate Lady Jane Grey, and now the property of the Earl of Stamford and Warrington. This embankment carries on its summit the public road leading from Leicester to the romantic district of Charnwood Forest.

The PRESIDENT remarked that the town of Leicester had increased in population during the last twenty years from 60,000 to 100,000. Twenty years ago there was no artificial supply of water whatever, the inhabitants being dependent entirely upon the wells of the town and water gathered from the river Soar, both sources of supply being of the worst possible description. At that time, when the necessities of the place, consequent upon its increasing size and great demand for water for manufacturing purposes, became apparent, the Leicester Water-Works Company was formed for obtaining an artificial supply. An Act of Parliament was passed which gave the company power to acquire the waters of a shed distant about four or five miles from that spot, and lying more to the west of Leicester. It was then presumed that that water-shed would be sufficient to supply the town for the next 40 or 50 years. It embraced an area of about 3000 acres, and at Thornton there was formed, at an elevation sufficiently high to enable the town to be supplied by gravitation, a reservoir, entirely artificial, of about two-thirds the magnitude of the new reservoir at Bradgate. The water was carried from that work about eight miles into the town, and at a distance of six miles there was established a service-reservoir, at a height of nearly 200 feet above the lowest part of the town. That service-reservoir contained about 2 million gallons, and received the water from the filtering-beds formed in immediate connexion with the large reservoir at Thornton. The rainfall of the district did not on the average exceed 29 inches, and the reservoir was capable of supplying 1¼ million gallons per diem. About five or six years ago, in consequence of the rapid increase of the town, apprehensions were entertained that the supply would become insufficient, as in truth it did just before the new reservoir was opened. The company then undertook a very bold adventure. They determined to go into the mountain district of Charnwood Forest, and seek to establish on the brook called the Bradgate brook the large work now being visited. The water-shed, by means of which the new reservoir was supplied, was about 4400 acres, including all the hills and a large extent of surrounding country. The reservoir itself contained about 500 million gallons, and its area in water surface was upwards of 130 acres. At its deepest part the water was 37 or 38 feet in depth, but it was constructed so as to be prepared for being raised, whenever occasion required, to an additional height of 2 feet 6 inches, land having been purchased all round it to enable that operation to be performed, and the embankment had been also constructed with that object in view. There was one peculiarity connected with the work which ought to be mentioned. Leicester was so situated that no further supply of water could be obtained at an elevation sufficient to enable it to be reached by gravitation. Accordingly—and this was almost the only instance of the kind on a large scale in the kingdom—the water after being impounded had to be elevated to the same height as the other supply, in order that they might both operate together. The works in connexion with the embankment were a large weir and bye-wash, and upon this point he wished to make an important observation. It was only of recent years that engineers had come to know what was the magnitude of the maximum flood to which this country was subjected by those extraordinary rains which, perhaps, occurred only once in 20, 30, or even 40 years. Of course, unless a reservoir was sufficiently protected against the results of those exceptional occurrences, the district below would be greatly endangered, because it might happen (as it had

happened within the last few days) that a great flood would come at the very moment when the reservoir was already filled. Should that state of things arise, and there be not sufficient vent for the water, a catastrophe was not only probable, but highly imminent. As would be seen in the present case the weir was of very great magnitude. On its outer edge it was 176 feet in length, and yet, large as it was, this weir would, in an ascertained maximum flood, be covered to no less an extent than two feet in depth. Probably at the time of such an occurrence, there would be a great storm of wind, and therefore, when it was considered that the water had not only to be raised two feet high on the embankment, but had also to rush down a kind of flight of stairs to make its escape, it would naturally be concluded that great care was requisite in the construction of this work. The drawings which the students would have the opportunity of inspecting would explain better than words could do the particular formation adopted, but there was something to be observed with regard to the nature of the protection of the soil under the bye-wash. It so happened that in this part of the country nearly the whole of the soil was of an alluvial character. It was a deposit of very fine silt, with a certain amount of aluminous matter in it, just enough to make it coherent, but not enough to prevent it being easily moved by water. Now in a case of that kind, and especially in a case where finely-cut pitching-stone could not be obtained (for there was no stone in the district capable of being dressed into the form which would be necessary to secure the weir in the manner in which weirs were secured in many other parts, particularly in Yorkshire, where the sandstone rock was extremely abundant), the first thing to do was to secure the surface of the soil to prevent the abrading action of the water. That was done by covering the whole of the channel with a considerable thickness of hydraulic concrete, very carefully prepared for the purpose. Upon that was deposited the ordinary slate-stone of the locality in large masses—masses that penetrated to a depth of 18 inches, and in some cases much more, the insterstices being filled up with small stones and other obstructive matter, so that the water rushing down the weir could not undercut the concrete, and so afterwards penetrate to the native soil. It might be thought that the weir was of unnecessary magnitude, but the object of going to this great expense was to enable the water to travel down it at a slight depth, for, notwithstanding the precautions otherwise taken, unless the velocity at which the water travelled was thus controlled, it might be that the rush would take out a number of these stones, large as they were, and set the whole mass in motion, so that they would roll down one after another, which, during a violent flood, when repair was quite impossible, would be attended with most serious results. The next thing he had to draw attention to was the character of the outlet for carrying the water to the filter-beds, and also for emptying the reservoir in any event requiring such an operation to be performed. The valves were placed in a vertical shaft, encased in solid masonry, and communicated with a tunnel passing from the inside to the outside of the embankment. This tunnel performed two offices. In the first place it carried off the whole of the flood water at the time the reservoir was under construction, and, therefore, it was made of a magnitude sufficient to convey, with about 20 feet pressure upon it, as much water as would flow over the weir. All this was carefully calculated upon hydraulic principles, with which, he presumed, a great many of those whom he addressed were already acquainted. At last there had to be undertaken the sometimes difficult operation of stopping up the tunnel, placing the valves in it, and making it perfectly water-tight. That operation was so successfully performed in the present instance that (as would be observed when the visitors passed up the tunnel) not a drop of water escaped. From the tunnel there was carried a large pipe, which conveyed the water to the filter-beds, where it was cleansed, and afterwards taken up by the engines and forced on to Leicester. Before, however, leaving this spot, there was one feature in the construction of the embankment which he wished to point out. It was almost entirely constructed of the silty material found in the neighbourhood, mixed with clay. But in sinking for the puddle-wall, upon which the water-tightness of the structure entirely depended, they, unfortunately, found the argillaceous silt was interleaved with beds of sand, and that from those beds of sand there issued small streams of water, indicating that it would be unsafe to commence the puddle-wall at what was then the expected necessary depth—viz., 12 or 14 feet below the surface. Consequently the ground had to be cut into (and this ground, as might be supposed, was of a very weak nature) to a depth in many places, and for great lengths, of at least 40 feet below the surface. The whole of that deep cutting had to be sustained by close timbering, and stretched across with heavy timbers all the way from one end of the embankment to the other. However, they succeeded in getting below the sand, and putting in the clay puddle-wall without any accident occurring; the whole of the timbers were drawn, and upon the admission of the water into the reservoir it was found that the entire construction was perfectly water-tight. Had that not been the case they might have had, with this moveable material to encounter, some difficulty, and probably some risk. He might before leaving invite an inspection of the Gothic bridge over the bye-wash, because it was rather a singular material of which it was constructed. All the mosaic facing of the bridge was executed in the green granite peculiar to the district, and was obtained from the Groby Quarry, at a short distance from the works. The reservoir, he might state, in answer to an inquiry by the secretary, was formed in a natural valley, and there was no excavation necessary for its construction.

The students having carefully inspected the bye-wash, shafts, and bridge, proceeded to the tunnel, at the entrance of which the president resumed his explanations. He remarked that very little need be said on the subject of the tunnel, because the students had seen the form of its construction, and the drawings would supply all the necessary details. There was one thing, however, which in a work of this description was of great importance, to call attention to—viz., the way in which the water was prevented from coming from the inside of the reservoir to the outside, at the point at which the tunnel perforated the great puddle wall. The way in which it was managed in this case was first by surrounding the central shaft with a great mass of puddle, which went down to the same depth as the wall itself. That made the structure of the shaft perfectly water-tight; but for all that, water would get through the shaft and under the tunnel if the puddle by any means should slip away by its non-consolidation from below the tunnel, leaving a vacuity beneath it. To prevent that, two lengths of the tunnel, one on each side of the shaft, were made separate and distinct, and those two lengths were called slip pieces. These two slip pieces were cut off and made distinct from the other two more extensive portions of the tunnel, and travelled down with the puddle wall as it consolidated, and in some cases the amount of travelling down was as great as 12 inches before it came to rest. Unless this precaution were taken, there would be a gap underneath of large magnitude, through which water would rush in great volumes, and would wear away the puddle. After the whole thing had come to rest, and the valves were fixed in the shaft, then the slip pieces were lined up with one ring inside the other to give them additional strength and stability. The first of those rings was brought a considerable distance down the tunnel, the next a shorter distance, and the innermost a still shorter distance, producing an appearance of telescoping, which would be observed at the head of the tunnel. The effect of this was to prevent any irruption of water into the tunnel, and at the same time to strengthen the construction against the powerful rush of water which occurred when the valves were opened.

From the tunnel the students passed to the large filter-beds, which are four in number, and of an ornamental character.

The PRESIDENT called attention to the nature of the sand which formed the upper stratum of these beds. Upon the character of that sand, he said, depended in a great degree not only the efficiency of the filtration by the rate at which it could be effected. This was an entirely silicious sand, carefully selected as such, because silicious sand was not only very granular (which had a good deal to do with the filtration), but it contained nothing soluble, nothing that would at all affect the chemical character of the water. This sand, which was a very expensive material, costing the company as much as 13s. 6d. per cubic yard, was obtained from the river Trent. Every particle of dirt was carefully washed from it, and it was then placed in the filter-beds to a thickness of about 2 feet 6 inches. The water passing through this sand not only left on the upper surface the whole of the matters which had been held in suspension in it, but to a certain extent the material of the sand oxydized the organic matters which were held in solution, and which, in waters of this description, always communicated a more or less brown tint to the water. When the water left these filter-beds there was scarcely the slightest tint perceptible. The water passed through the sand at the rate of 6 inches vertically per hour, which gave rather more than 750 gallons in 24 hours through every square yard of surface. There was one peculiarity in the construction of these filter-beds. In all filter-beds which had been made until recently, the sand had to be removed for the purpose of being cleaned. It was first thrown up into a heap, and then carefully washed. In this case the sand never came out of the filter-bed. When it became necessary to cleanse it, a layer of about ⅜ in. in thickness was taken off the surface with its deposited matter, and was put into an iron tank about 2 ft. 6 in. deep, constructed in the centre of the filter-bed. Here it was washed by means of jets of water passing up through it, the contents of the tank being at the time violently agitated by the workmen. By that process all the impure matter was removed from the sand, which, when washed, was returned to the bed without any perceptible waste, ready for another filtering operation. The water, after undergoing the process of filtration, is conducted to a central pure water-tank of octagonal figure, from whence it is pumped to the service reservoir. Beyond the filter-beds, on the grounds of the company, is an ornamental lake, from which the engines are supplied with injection water, 20 superficial yards of surface per horse power being found sufficient to keep the water at the proper temperature for that purpose. After passing through the engines, the condensed water is returned to the lake, to be used over and over again.

Passing onwards, the students next visited the engine-house, which is a handsome structure, designed in the mediæval style, and provided with a tall tower, by means of which the three successive floors of the engines are reached, and which, being carried up to a height sufficient to conceal within it the boiler chimney, gives access to a gallery, from which a fine view is obtained of the surrounding country, and of all the works.

The PRESIDENT again addressed the party, and called their attention to the fact that there were two engines, each of 80-horse power, engaged in pumping the water at the rate of 2400 gallons per minute, either into the service reservoir situate at New Parks, or more directly into the town, as the conditions of distribution might require. These engines are constructed upon the double-cylinder principle, and are arranged so as to expand the steam into two volumes in the small cylinder, and then to expand those two volumes into four other volumes, making eight altogether in the large cylinder. By that means a very great economy of fuel is effected. The valve gear, of course, is a little more complicated than it would be upon the single cylinder principle, but not so as in any way to become inconvenient in the working. The two engines face each other, so that the man standing between the two sets of handles can manipulate both without difficulty and at pleasure. The pumps are double-acting, on the bucket and ram principle, each of the diameter of 27 inches, having half the stroke of the engines. The engines have a stroke of 7 feet, the pumps each 3 feet 6 inches. The fly-wheels are each 21 feet in diameter, and in ordinary working make 14 revolutions per minute. There are four boilers for the supply of steam, one of which is kept in reserve, to be used whenever it becomes necessary to take off either of the other three for cleaning or repair. The president called attention to two large air-vessels designed to operate as a spring. At the moment when the pumps, which, of course, act intermittently, force the water forward into the main, the air in these vessels becomes compressed, taking off the jerk, immediately afterwards expanding, so maintaining a perfectly equable motion in the pipe. An examination of the pressure-gauge connected to the main-pipe would show that it oscillated by the action of the engine only through a very small space, thus indicating that there was no violent action on the pipe.

The service reservoir is vaulted over, and contains two million gallons of water. It is intended to be supplemented by a second service reservoir, to be situated on the Bradgate main, at a place called Gilroes. The conduit mains are about 16 miles in length, and vary in diameter from 18 to 24 inches. The system of distribution is very general, and extends to a length of 60 or 70 miles. The capabilities of the undertaking are to be measured by the rainfall of the district and the area of the watersheds. The average rainfall is about 29 inches, but this is reduced by re-evaporation to a net quantity of about 14 inches, and on the mean of three consecutive dry years of exceptional character the available quantity is found to be further reduced to about 9 inches. As, however, the watersheds comprise 11 or 12 square miles, this smaller amount of rainfall produces a daily quantity of four million gallons, being a quantity adequate to the supply of 200,000 people, at the economical rate of 20 gallons each, or of 160,000 people at the more extravagant rate of 25 gallons each. The undertaking has been devised and carried out by the directors of the company in the most liberal spirit, and with the utmost regard to its efficiency for the purposes for which it was intended. It may be added that the works at Bradgate Park were commenced in January, 1869, and the first water was pumped in October, 1870; the cost being £130,000, including the line of mains into the town.

The students, having now inspected the whole of the works and drawings, and having ascended the tower, assembled with the rest of the company in an elegant marquee, gay with flags and banners, where a sumptuous entertainment was provided for the party, which numbered in all about 200, including several ladies, the M.P.'s for the county, the Directors of the Water-Works Company, the late President of the Institution of Civil Engineers, the President of the Institute of British Architects, Dr. Letheby, the Mayor of Leicester, Dr. Pole, Capt. Galton, Sir John Duckworth, Mr. Bramwell, Mr. Abernethy, &c.

The PRESIDENT occupied the chair, and Mr. ELLIS, chairman of the Water-Works Company, officiated as vice-chairman.

An excellent band was in attendance, and played some lively airs during the day.

After the usual loyal toasts,

The CHAIRMAN proposed—"The three Services," coupling with the toast the name of Major-General Scott, who, he said, represented on that occasion the International Exhibition, an exhibition which he hoped and believed would tend very much—indirectly though it might be—to increase the prosperity of this country. General Scott had distinguished himself not only as a member of the profession to which he belonged, but also by the great interest he had taken in many ways in the advancement of the industries, and he might add the wealth and general advancement of his country.

Major-General SCOTT responded.

The CHAIRMAN next proposed—"The two Houses of Parliament," coupling the toast with the name of the senior member for the county of Leicester, Mr. Pell.

Mr. PELL, M.P., in responding, said the party were assembled that day in a park which was once the playground or the study-ground of a famous lady—Lady Jane Grey—and, as regarded time, there was some connexion between her name and matters in which they were concerned. About the time that Lady Jane Grey lost her head, one of the greatest engineers England ever knew was completing one of the greatest works that England ever saw. He need

scarcely say that he referred to Sir Hugh Myddelton, and to that important undertaking the construction of the New River. Speaking of the early difficulties which stood in the way of the execution of engineering works of this description, Stowe said, "In all great measures you will find among the people that you will have to encounter danger, detraction, contempt, scorn, derision, yea and desperate despite." He (Mr. Pell) feared from what they sometimes heard of proceedings in committee-rooms that it might be supposed this state of things still existed in the House of Commons. It had been his fortune, good or evil, to serve upon public committees only, but he could only say that if all great undertakings which had been fought over and obtained the sanction of Parliament in private committees, were to end in so pleasant and hospitable an entertainment as the present, it was worth something to take part in such proceedings.

The CHAIRMAN proposed—"Prosperity to the town and county of Leicester."

The MAYOR of LEICESTER responded.

The CHAIRMAN next proposed—"Success and prosperity to the Water Company of Leicester," associating with it the name of the chairman of the company, the vice-chairman on this occasion, his particular and esteemed friend, Mr. Ellis. He said he scarcely ever knew a company conducted with such energy as the water company of Leicester. They began their operations for the supply of the town under great difficulties, and with small means, but by their public spirit, and by the outlay of but little short of a quarter of a million of money, they had accomplished the supply to the growing population of the town of Leicester of the greatest necessary of health, not only for the present generation, but for the generation to come. To the directors of this company the town and neighbourhood were very much indebted, and to his friend Mr. Ellis the company, as well as the town, were still more indebted, for it happened that, in the course of the construction of the works, circumstances so turned out that the management and control of the physical operations devolved upon him. Not only for his untiring energy and perseverance in conducting the affairs of the company, but also for the very remarkable talents he displayed when, at the request of his brother directors, he undertook the unremunerated duty of locally controlling the practical operations which had devolved on the company by the withdrawal of the original contractors, he had conferred upon the company a lasting obligation.

Mr. ELLIS, in responding, said he had never seen works designed with so much care and attention as these, and he cordially recommended the students present to study well the drawings and specifications which had been opened for their inspection. He was delighted to know that the individual under whose direction these works were constructed occupied the high and honourable position of president of one of the most distinguished institutions in the country—the Institution of Civil Engineers. Without engineers what progress could this country have made? How much of the material prosperity of the country was due to the skill and energy of men like Myddelton and Brindley, and Smeaton and Telford? He heartily congratulated Mr. Hawksley upon the dignity to which he had attained, and he confessed to a feeling of pride that the President of the Institution of Civil Engineers had thought it worth while to invite this distinguished company to visit the water-works of Leicester. He had much pleasure in proposing the health of the chairman.

The toast was drunk with great enthusiasm.

The CHAIRMAN said he thanked the company from the bottom of his heart for the honour they had done him. As, however, brevity was the soul of wit, it was not at that hour of the day possible, or proper perhaps for him to attempt to justify the kind observations of his friend, the chairman of the water company. That he should have been afforded by that gentleman the opportunity of carrying out the intention which he announced when he took the chair of the Institution of Civil Engineers was to him a very great pleasure. He felt that when the Institution of Civil Engineers had created a new class of students, it was the duty of the gentlemen who were upon the council of the Institute, and more especially of the President for the time being, to afford those students every opportunity that presented itself for the acquisition of professional knowledge. The chairman of the Leicester Water Company had made such an opportunity possible, and in consequence of that it was that the present party were assembled. He might say that he had had nothing but pleasure in acting for the Leicester Water-Works Company, and if it should be that the young gentlemen before him should, as he hoped they would, act in future years in a similar capacity to that in which he had been called to act, he only hoped that their occupations might turn out as pleasurable as his had done. Before sitting down he would propose—"Health, success, and prosperity to the students of the Institution.' He sincerely hoped that in their future separate careers, which he knew would carry them over the whole of the civilized globe, they would not be less successful in their undertakings than it had been his good fortune to be in the undertaking they were now assembled to witness. He was sure that in the progress of scientific knowledge they would come to surpass the engineers of the present day, and that the works of the future would diminish and almost extinguish the works of the present. In proposing—"Health, success, and prosperity to the students of the Institution of Civil Engineers," he begged to thank them in his own person for the honour they had done him in being there on that occasion.

Mr. MORT (senior student) appropriately responded to the toast.

The CHAIRMAN said they were honoured with the presence of two very distinguished men—Mr. Wyatt, President of the Institute of British Architects, and Dr. Letheby—and he had pleasure in asking the company to join in drinking their health.

Mr. WYATT having replied,

Dr. LETHEBY added a few remarks, concluding by proposing—"Mrs. Hawksley and the ladies."

The CHAIRMAN responded, and gave as the concluding toast—"The visitors," coupling with it the names of Sir John Duckworth and Mr. Heygate, M.P. for the county.

Mr. HEYGATE returned thanks.

Before leaving the marquee, the CHAIRMAN called upon the students to give a hearty cheer for Mr. Williams, the secretary of the water company, and Mr. Forrest, the secretary of the Institution of Civil Engineers, by whose exertions the admirable arrangements for the entertainment had been carried out.

The invitation of the chairman was most enthusiastically responded to.

The company were afterwards conveyed in carriages through Bradgate Park, the property of the Earl of Stamford and Warrington, who had obligingly granted permission for that purpose, and visited the ruins of the residence of Lady Jane Grey, and other spots of great interest and beauty. From thence they drove to Leicester, and returned to London by the evening express train, arriving shortly after 10 p.m., having spent a most agreeable and instructive day.

LIABILITY FOR GAS-RATE.—At the Brighton County Court, on the 20th ult., Mr. Mendel was sued by the gas company for gas supplied. The defendant was manager to the Paris and Vienna Bread Company, Limited, now in liquidation. The gas was supplied to the offices of the company, and the question was whether the defendant or the company was liable. For the plaintiffs it was asserted that they had never recognized the company, but had all along dealt with the defendant as the responsible party. The defence was that Mr. Mendel was only a servant of the company, and it was hard, therefore, to sue him for the company's debts. The judge (Mr. Furner) said in companies of this sort it was often very difficult to find out who really was accountable. He did not think the gas company would have entered the debt to the defendant unless he had made himself responsible, and he should therefore find a verdict for the plaintiffs.

BRITISH ASSOCIATION OF GAS MANAGERS.

(Continued from page 546.)

Mr. WARNER (South Shields) read the following paper

ON GOVERNORS AND THE GOVERNOR ROOM.

I have to differ on this subject, as I have done in my paper on meters, with the author of the "History of the Gas-Meter." He writes, "The reflection is irresistibly forced upon us of the advantage which has arisen from the original defects of the meter, for to that is probably due the invention by Clegg of that simple and useful instrument—the Governor. I believe the two instruments were separate and distinct inventions, and the germ of the two was found in the gasholder." "One of the uses of the gasholder," Peckstone writes in 1823, "is to regulate the emission of the gas toward the burners, which could not be effected without such contrivance." And Accum, in 1819, says, "Various methods have been adopted to attain this object, to preserve the gas of an invariable density, some of which were exceedingly ingenious and creditable even to such as Malam." "But the expensive and cumbersome specific gravity appparatus," Accum proceeds, after describing some of these arrangements, "has been wholly superseded by an ingenious contrivance called the regulator or governor. The action of this machine, for which we are indebted to Mr. Clegg, is that it regulates the gas prior to its entering the mains to any required degree, whatever its density may be in the gasholder."

Mr. Clegg's invention was patented December, 1815, and is described in the specification thus: "The pipe through which the gas passes to the burners must have in some part of it an aperture which is capable of beinglincreased or diminished in its opening by a very slight force, and motion for increasing or diminishing the aperture is given by a small gasometer or inverted vessel, the mouth of which is immersed under water, and its interior capacity communicates with the pipe of supply beyond the part where the aperture for regulation is placed. The operation of the governor is to regulate the pressure with which the gas shall be urged to issue from the burner. This pressure is determined by means of a certain load applied upon the gasometer, so as to occasion a sufficient difference between the level of the water inside the gasometer and the level of the water on the outside thereof; the action of the governor will be to keep this pressed constantly the same."

We have here, in the clearest possible manner, the theoretical construction and operation of this exceedingly simple machine; and in neither could we, with our additional fifty years experience, improve. But in the actual construction there was a defect which had to be, and was at once remedied—the valvular arrangement—the substitution of a cone for the hydraulic valve. This doubtless, was done by Mr. Clegg, as Peckstone says it was Mr. Clegg's practice to make his governor with a cone. There was another, but a slight defect, and not of much practical importance, early discovered in use, though it must have been known at the time of the invention. Mr. Crosley appears to have met the loss of weight and pressure of the gasholder by its immersion; for he, as will be seen by Accum and Matthew, on the History of Gas Lighting, made the holder conical, smaller at top than at bottom. Dr. Muspratt quotes Hughes as his authority for proportions of governor; he says the tank is usually somewhat less in depth than the diameter, and with the capacity of about two cubic feet for every 10,000 feet of gas required to be passed through in twenty-four hours, and he gives a holder of 4 ft. 6 in. deep and 5 ft. diameter to an 8 in. valve.

The object of this paper is to give this association the results of a practical examination of the ordinary governor on each of these three points:—First, as to the form of valve; secondly, loss of pressure by immersion; thirdly, the relative proportions of valve and holder. As to the form of valve, Clegg says it must be an aperture capable of being increased or diminished in its opening by a very slight force, but there is also another condition that it be possible to entirely close it. Among the number of patents that have been granted for governors and regulators, every possible form of valve has been pressed into the service, but none appear to answer the conditions laid down so well as the cone moved by a very slight force and perfectly valvular. The relative proportions of cone employed may not be uninteresting.

Clegg, jun., "Manufacture of Coal Gas"	6	diameter of base.	
Clegg, per Accum and Peckstone	4	"	"
Dr. Muspratt, "Chemistry, Arts, and Manufactures"	4	"	"
Wright, per Edge's patent (parabolic)	2	"	"
"Hughes on Gas-Works," as revised by Richards.....	2	"	"
Crosley, specification patent regulator	2	"	"
Malam, per Accum and Peckstone	1	"	"

It was in an arrangement of the governor as an inferential meter that the parabola, I believe, was first employed. Hughes says the opening can be adjusted with much greater certainty when the parabolic form is used instead of the true cone, as will be evident if we consider that sections of a parabola parallel to the base decrease in direct proportion to the height at which they are taken, whereas the sections of a true cone decrease as the square of the height. It follows then that a parabolic piston will open or close a space in exact proportion to the height through which it is lowered or raised, whereas a truly conical piston will open or close a much larger space when the part near the base of it rises one inch than when the upper part of the cone rises through the same height.

This leads us to the second point, the gasometer, the holder, the bell, the float, as it has been called; the volume chamber, perhaps, would be the best name to distinguish it by, for it is by the increase or diminution of volume only that a perfect regulation of pressure is effected, and it is this which distinguishes the true governor from all others, however ingenious it may be. Several arrangements have been patented of the adaptation to the governor of the ordinary pressure-gauge, with valve and float on the gas column; but it is evident there can be no change of volume in such an instrument without a change of pressure, as the action of the instrument is entirely dependent upon the change of pressure. The diaphragm, however, gives a true volume chamber, the weight is constant, the resistance uniform, hence a variable volume with a constant pressure. Doubtless, the best form of volume chamber is that of the original—a small gasholder in a tank of water—but there is a variable pressure in its action from the displacement of the water.

Crosley seems to have been the first to meet this defect with his conical chamber, and Wright, in the machine before alluded to, has a weighted arm to fall from the vertical when the chamber is just out of the water, to the horizontal when immersed, thus compensating for the loss of weight as the holder descends by an increased leverage of the weighted arm. Sugg's photometrical governor has a somewhat similar arrangement. It will be seen by the diagram that this compensation is not uniform—the leverage not corresponding with the space passed through—thus, as shown with only five-tenths of the space passed through, there are nearly seven-tenths of the compensation spent. By the cycloid, however, a perfectly true, steady, and friction-less compensation is effected. In this, as shown in the other diagram, the leverage and space passed through are equal—five-tenths of the space and five-tenths of the compensating lever. By the use of the cycloid, then, we have a perfect volume chamber that will give motion to a valve for regulating the flow at an uniform pressure. Hughes gives a capacity of two cubic feet to tank of governor for every 10,000 feet of gas to be passed.

In the discussion upon Mr. Hunt's governor at our last meeting, it was stated that the "area of the gasholder should be as many times the area of the cone as it is desired to reduce the pressure;" and, again, that "they bear a direct proportion to each other." Mr. Hunt also says in his paper "that those governors are most to be depended on in which the greatest

difference exists between the area of the gasholder and the bottom of the cone;" and against this it was asserted that "small gasholders, with large cones, had been found to work admirably enough in certain conditions."

The results of an examination of what has been published are as follow, arranged from the lowest diameter of base of cone:—

Mr. G. Anderson, per Clegg	2½ times	2½ deep.
Mr. S. Clegg, specification	4 ,,	11 ,,
"Hughes on Gas-Works," as revised by Richards	5 ,,	5 ,,
Mr. Clegg's fourth edition "Gas Lighting"	5 ,,	4½ ,,
Mr. L. W. Pritchard, ditto	6 ,,	5 ,,
Mr. Wright, Edge's patent	7 ,,	3 ,,
Mr. S. Clegg, jun., second edition "Gas Lighting"	7½ ,,	6 ,,
Mr. J. Malam, per Peckstone	8 ,,	3½ ,,
Mr. S. Crosley, specification diaphragm	10 ,,	— ,,

It is a source of considerable regret that I cannot give you the results of experiments upon the three points I have dwelt upon—the form of valve, the action of volume chamber, and the relative proportions of these.

I place before you an apparatus for the purpose, but which was not finished in time to try the experiment for this paper. With the permission of your committee, I will hand in the results of experiments to the secretary for publication with the transactions of the association.

I will now briefly draw your attention to some modifications in the governor which I have made, and had in use some time at the South Shields Gas-Works. The first is an entire enclosure of the whole working parts of the governor, not only the gasholder or volume chamber, but also the shifting counterbalance, so that it is not possible for any accident to happen in the working of the governor.

The holder being entirely enclosed, communication with it for adjustment is by a bridle and lever keyed on to a horizontal shaft passing through a stuffing-box, the lever and counterbalance being also enclosed in a case. Attached to the lever is a small cord passing over pulleys, and actuating a spindle carrying a fixed and a loose pointer; the fixed one is for indicating the area of valve opening, and the loose one is for registering the maximum opening during the twenty-four hours. I have also attached an equilibrium arrangement of valve. In a separate tank there is a floated holder of the same area as the base of cone, to which it is connected by means of a cord passing under two pulleys; the interior of holder communicates with the inlet, and the outlet pressure acts upon the exterior of the holder, so that the valve is thus balanced. I have this attached to a governor with a cone 16 in. diameter at the base, and the pressure is perfectly steady from nil to 5 inches. Dotted in in fig. 3 is another arrangement, which I have had in use for the last seven years. The top of the inlet pipe is turned true, and the underside of valve plate is also surfaced, the plate lies loose in its place, and is of sufficient weight to resist any ordinary action upon it by the cone, but in case of a stoppage of engine, &c., the cone carries it up from the top of the inlet pipe, and so effects a simple bye-pass. The lever form of counterbalance is here very useful for returning the valve to its normal condition of exhausted governor.

Richards is the only one who has given the governor-house a separate article in a work on gas lighting; no other author has mentioned it. I have distinguished this building as the governor-room, because, in the case of most works, it would be more convenient and economical in working for it to be but part of a building not to be used only for valves, meters, and governors, but for the whole of the mechanical work of the establishment, engines, exhausters, pumps, and a workshop with lathe, screwing machine, &c. In my own works space is very limited, and I was unable to carry this into practice, so that I have but the valves, meters, and governors, with pressure gauges and registers, as shown in the drawing. I do not know that there is any great novelty in the arrangements.

Besides the outlet-valve of holders being in the house, I have a bye-pass direct from the meters into the cylinder for feeding the governor. Each outlet of governor has a connexion to a meter for the purpose of testing each district during the time of non-consumption. The meter (A, fig. 6) was not fixed for this work, but for a purpose which will show the value of thoroughly districting a town and working it at the pressure most suitable for it, not only as to its level, but also as to the nature of the consumption. At Shields, not far from the gas-works, is a very fine market square, filled with stalls, exhibitions, &c. On a Saturday night and other occasions, all these are well lighted from stand-pipes rising from the ground, the fittings of which never being in order the loss of gas was very considerable. The market, too, being supplied from the principal main at the initial pressure, the consumption was very great, and being contract lights the loss to the company was considerable. This I remedied by running a separate main to the market and fixing a meter and governor; and, instead of the gas blowing away at two inches pressure, it was reduced to one-third for lighting, and then entirely shut off during the remainder of the twenty-four hours.

So with the other portions of our district. Near to the town is a little village at a considerable elevation above the town; this was cut off from the town-main and worked at a proper pressure, instead of that of the town. The riverside portions, too, having factories—some of which were working all night, and others starting early in the morning—required different pressures from the quieter portions of the town. Jarrow, with its large iron shipbuilding-yard and chemical and other works, being from three to four miles from the gas-works, again, required and has a very different pressure from any other portion of our district. The result of these changes, and a more careful attention to other details of distribution, is a very considerable reduction in the quantity of gas unaccounted for.

Mr. HARTLEY said Mr. Warner expressed surprise that there was so much divergence in the character of the cones of governors. He (Mr. Hartley) thought that this divergence had arisen from a misapprehension as to the proper form. The true cone was objectionable because it required an enormously long stroke to produce the best effects, and the effects which it did produce were unequal for equal lengths in part of its stroke, and this also rendered the scale of the instrument unequal in its significance. As the result of experience, he found the parabolic form the best, and that it was not necessary that the length should exceed twice the diameter. If even shorter the cone would, under certain conditions, do its work quite well. As to the proportion between the gasholder and the cone, that varied with a variety of circumstances. Mr. Warner said that Mr. Wright had given a certain ratio between the cone and gasholder, but he (Mr. Hartley) never knew that Mr. Wright had ever done so. He (Mr. Hartley) however knew as a fact that Mr. Wright had made governors with gasholders and cones in very different proportions to each other. A great deal depended, at times, not on the will or conviction of the makers of governors, but upon the will or conviction of the engineer for whom they were made. For his (Mr. Hartley's) own part, he knew that when the holder bore the proportion of about six times the diameter of the cone, a thoroughly efficient working governor was the result. The gasholder could with advantage be made smaller than this proportion, but if very much smaller the governor required a regulating diaphragm or some controlling arrangement, as otherwise there was a tendency to jumping and oscillation. In some governors the gasholders were made larger than was absolutely necessary in other respects in order to afford space for a float, while with others the question of appearance had to be considered. With reference to the enclosure of the governor, he confessed that he did not believe in it. He thought the governor was an instrument which should have its gasholder visible, and he had not found in his experience that men tumbled against it, and so did harm, which was suggested by the writer of the paper as a reason for covering it up. In respect to the chances of disarrangement or disturbance a tolerably large gasholder was good, because the action of the instrument would be less affected by rough manipulation. In theory, therefore, a large gasholder was advantageous, but in practice a smaller holder was as good, if the governor were provided with a steadying arrangement, such as he (Mr. Hartley) had mentioned and applied.

Mr. HUNT (Vauxhall) said he thought it should be borne in mind in respect to the relative proportion of the cone and the gasholder actuating it, that much depended upon the pressure at which the gas issued—i.e., the action of the gas upon the bottom of the cone. Where there was a tendency to great variations of inlet pressure the relative proportion of the cone and the gasholder should be greater. It had been assumed by the writer that it was absolutely indispensable for a governor to have a cone, but he (Mr. Hunt) had the honour at the last meeting of the association to submit a form of governor in which a throttle-valve was substituted for a cone. The advantages of such a substitution were obvious—they got rid of the enormous dimensions necessary now to have in the cone form of valve. All that was required to be overcome was the friction necessary for the bearings of the throttle-valve, which, by his arrangement, was reduced to a minimum, while the most satisfactory results were obtained.

Mr. HARTLEY said that in his remarks he had addressed himself to the consideration of cone governors only, as Mr. Warner's paper treated of no other kind.

Mr. PATERSON (Warrington) said he quite agreed with Mr. Hartley. He thought there was no proper, or perhaps he should say no better form of cone than the parabolic. All other forms had certain objections. The proportion of the diameter to the length Mr. Hartley had rightly represented as about one to two, but he was not quite prepared to agree with him on the subject of large gasholders, because he did not consider they were needful. He had been accustomed to use governors as governors, but he did not depend upon them to furnish the needful quantity of gas during the height of the supply. In addition to his governors he had by-pass valves for the purpose of regulation, and made use of his governors as governors. Consequently he had a pretty long range in them with a flange, and he found no tendency in them to create a blinking. He did not think large gasholders were necessary even for large mains, and he was at the present time putting down a 16-inch main with only a 12-inch area for the governor, which he apprehended would be found quite sufficient for all purposes.

Mr. WARNER said the principle of shutting off the pressure was recognized and provided for in the first governor constructed. With regard to the shape and size of the cone, the principle for regulating these points was clearly laid down by Mr. Clegg in the quotation given in the paper just read. He (Mr. Warner) did not think that either the shape, size, or form, had anything whatever to do with the regulation of pressure, provided the volume chamber passed through the whole range of its travelling unaffected. He had not seen governors with balance or throttle valves, but he thought it must be a very difficult matter to make a truly valvular aperture by means of a throttle-valve so that it should be perfectly gas tight.

Mr. J. STORER (Stafford) read the following paper on

AN EXHAUSTER SPEED REGULATOR.

There is but very little difference in the opinion of engineers and managers of gas-works that an exhauster is an indispensable part of the manufacturing plant, although there is to some extent with reference to the labour required for working it, and the financial results obtained thereby. It is, therefore, the object of my paper to lay before the members of this association a simple and inexpensive arrangement, whereby much time and labour of the man in charge of the engine and exhauster may be saved. As a matter of course, this will be a greater desideratum in the majority of provincial works, where the foreman stoker is in charge of the engine, than it will be in large establishments, where it is requisite to keep a man for that particular purpose. In all works, however, it is essentially necessary that the speed of the exhauster should be so regulated as to maintain an uniformity of pressure in the hydraulic main; and the usual method of accomplishing this is by a governor A, connected with the inlet-pipe to the exhauster, which rises or falls accordingly as there may be a pressure or vacuum at that point. It is also attached by a vertical rod B, and horizontal lever C, to a throttle-valve, fixed in the steam-pipe leading to the slide-valve of the engine; the valve being opened or closed by the action of the governor, thereby regulating the speed of the engine, by controlling the supply of steam. But with this arrangement, the engine does not work with that regularity which is always desirable it should do, in consequence of the distance of the throttle-valve from the steam-chest; the action of the governor is not quick enough to prevent a considerable variation in the pressure in the hydraulic main. Now, the link motion, by being connected to the intermediate shaft D, entirely obviates this fault by its direct action on the slide-valve E, either shortening, or lengthening the stroke instantaneously; thereby shutting off or admitting more steam as may be required. In other words, the engine is made to work expansively, whereby a saving of steam, and consequently of fuel, is effected.

The saving of labour is accomplished by the link motion maintaining constantly, without any alteration, the requisite pressure or vacuum in the hydraulic main, either during the maximum or minimum make of gas through the day. Providing the steam is kept within a range of 20 lbs., that is, supposing 30 lbs. is the requisite pressure, it will allow of a variation say from 25 to 45 lbs. This I consider to be a great desideratum in a moderately sized works, where a stoker has charge of the engine, because it saves him the trouble of leaving his work during the time he is charging the retorts, in order to attend to it.

Another object gained by the regularity of the working of the exhauster is a prevention, to a great extent, of the formation of carbon in the retorts; and, consequently, an improvement in the illuminating power of the gas.

In introducing the subject of my paper to this meeting, I have endeavoured to be as brief as possible, still I hope that whilst I have endeavoured so to do, I have not failed to make myself sufficiently clear, so as to be perfectly understood by all to whom I have had the honour of reading it.

The proceedings then closed.

At the Evening Sitting a Lecture was delivered by Dr. ODLING, on "Sulphide of Carbon," a report of which will appear in a subsequent number of the JOURNAL.

WEDNESDAY, JUNE 12.

The PRESIDENT took the chair this morning at eleven o'clock.

Mr. G. ANDERSON (London) read the following paper

ON THE CHEAPEST AND BEST MEANS OF ABSTRACTING AMMONIA.

Gentlemen,—I appear before you again to read a paper on the purification of gas from ammonia because the council requested that I should do so.

You will find that I read a paper on this subject before the society at its meeting in Nottingham in 1867.

I apprehend that the reason why the council have this year requested a paper on the same subject is due to the increasing importance of the question, both as a sanitary one in the improvement of the gas, as well as in its commercially beneficial results to gas companies.

There is another reason, however, which to my mind renders a paper on this

question peculiarly appropriate this year, because we have had a very elaborate report on this particular point from the London Gas Referees since our last meeting, and published in the JOURNAL OF GAS LIGHTING of the 29th of August last; and before proceeding to the matter more germane to this paper, I desire to say a few words on that report.

From a perusal of that report it appears that the referees found several of the London gas companies supplying gas impure as regards ammonia. It also appears that they found many of the scrubbers of defective construction, both from the fact of the scrubbing material being in a continuous mass, and not relieved by being placed in separate layers on shelves, as also from the apparatus for distributing, the liquid used being of an imperfect kind; and they give recommendations for remedying those defects; they also, in the summary of their proceedings, state that the statistics they have furnished will be interesting on public grounds, and of practical value to gas companies and their engineers, and I have no doubt they will.

But in the interest of the profession to which I belong, I beg to state that there is no fact or recommendation in their report that is not well known to many gas engineers, and have been acted upon in the construction of gas-works, and that from the published proceedings of this society all that is good in their report may be found.

It is not my wish in any way to detract from the merits of that report. It is a very valuable report, and will repay perusal by any one interested in the subject. I rose from the reading of it very much pleased, as much so as if I had written it myself, because it confirmed opinions that I have publicly expressed before you on controverted points, when I have impressed on you the desirability of purifying your gas; but, I said to myself, if this thing goes on, if those gentlemen of intelligence and resource, and paid for doing it, publish reports of this kind, they and the Gas Managers Association will become competing bodies. We have years ago recorded in the transactions of our society the very facts on which they dwell as improvements which they are introducing into the London gas-works, and we, therefore, claim priority of knowledge of the facts, and also of the practical application of them, in proof of which I refer to the paper read before this society at Nottingham in 1867, on "The Extraction of Ammonia from Gas and the Utilization of the Products." But the propriety of purifying our gas from ammonia was recognized and acted on bp both George Lowe and Alexander Angus Croll, as London gas engineers, many years ago.

I have no doubt but the referees are not aware that more than 20 years ago the whole of the gas supplied by the Great Central and Surrey Gas Companies was absolutely free from ammonia. The former supplies the City of London, the latter a portion of the south side of the metropolis, and during the time that Mr. Croll, their lessee, had the conduction of the works, this state of purity remained.

They also may not be aware that George Lowe, five-and-twenty years ago, employed a scrubber with the contained matter in layers, the under half of which was washed with ammoniacal liquor, and the upper or finishing portion by clean water.

A drawing of this scrubber, used in my paper in 1867, is again placed on the wall.

The referees, in their report, confirm a statement I made to you in 1867—namely, that clean water, used judiciously, does not injure the illuminating power of the gas, and they point to the desirability of a better system of distribution than generally exists, and recommend the revolving system of Mr. Mann. That these points have all been previously attended to, I claim your attention to an extract from my paper of 1867, and to the drawings and models that illustrated it.

The gas referees are an important body, they have vast interests committed to their care; without the slightest doubt, if they continue, they will improve the gas of London, and that improvement will be published over the world. Until, however, they publish something new, we of this society, composed chiefly of gas engineers from all parts of the country, must claim to have anticipated them in their researches; and I will further state that had the gas engineers of London joined us—most of whom have, from some cause, held aloof—they might have gleaned some information that would have brought their state of knowledge on a level with that of the rest of the country, and prevented them being caught asleep by a body, however intelligent, who do not pretend to anything more than to theorize on the subject.

Before passing from the referees report, I think a word of extenuation may be said for some of the London engineers having allowed their gas to pass to the public unpurified.

I do not think that it was so much want of knowledge as want of wakening up; they went to sleep under the 10 per cent. dividend clause; they had arrived at that happy state of development, while yet in a semi-chrysalis state, and the want of further motive to action prevented them getting developed beyond that stage of existence. The Legislature, I think, is to blame for this, in requiring that the dividend cannot go above 10 per cent. If the profits beyond 10 per cent. were to be divided in given proportions between the companies and the public, and the companies were to increase the salaries of the engineers as the profits increased, the referees would have found less ammonia in the gas, for ammonia means gold dust that is worth washing out; and it is to be expected that, from the attention which the subject of ammonia is now receiving, our London gas engineers will receive such an impetus as will send them rapidly to the front, where they will occupy the position they ought never to have receded from.

The discussions to which I have referred have very much cleared the subject of the doubt and uncertainty that formerly surrounded it. We have, therefore, a considerable amount of solid ground to stand on. From the papers and discussions of this society, we have established, and the same has now been confirmed by the report of the referees:—1. That it is right to extract the ammonia from gas; 2. That this may be done by the use of ammoniacal liquor and pure water; and, 3. That the quantity of water necessary to do this when properly applied, does not injure the illuminating power of the gas; and I may add that, unlike the other impurities that have to be removed from gas, while they are all a source of expense, ammonia extraction is a source of profit in all works of any magnitude.

This latter fact gives an additional interest to the question this year from the extraordinary and hitherto unprecedented and sudden rise that has taken place in the price of coal, of iron, of bricks—indeed, in the price of everything employed in the manufacture of gas.

In the report of the referees, they mention the use of washers and of scrubbers; but they do not seem to have met with, nor do they contemplate, the use of both machines at once on the same works. This is another point which I deem of some importance, for, by using the washer first and the scrubber last, I get the whole of the tar removed from the gas while it is passing through the washer, and my scrubber is kept clean, a matter which they pointed out as a defect of the arrangements in some of the London gas-works.

I will now proceed to point out (although the same has been stated before) the conditions which I consider advisable, and which I adopt in all the works I erect.

1. Carry off the gas, ammoniacal liquor, and tar together in the one pipe, laid nearly horizontal, and commencing at as high a level as the hydraulic main will admit.

2. Cool the gas slowly and evenly. This I find best done by carrying a main against the wall of the retort-house, first inside, then outside, and finishing in a water-condenser, rather than in pipes exposed to the fluctuating temperature of the atmosphere.

3. Before the condensing-pipe is allowed to descend, make provision for catching all the ammoniacal liquor and tar, and let it deposit itself in a cast-iron tank the top of which can very conveniently be at 1 to 2 feet below the level of the hydraulic main, and the bottom of it may be 4 or 5 feet above ground.

The object of this arrangement is that the process may be self-acting and require no manual labour.

A moment's reflection shows how very silly it is to allow all the tar and liquor to descend from the hydraulic main into a tank sunk in the ground, the whole of which has to be raised therefrom before it can be disposed of in any way; yet such is the general mode adopted in the construction of gas-works.

This reflection I am sure you will excuse, although it has nothing to do with the subject of this paper, for tar and liquor pumping is both an expensive and a nasty operation.

The tank being placed at the elevation I name, the liquor will run from it by its own gravity to the washer, which is placed on the outlet of the condenser.

The washer I employ breaks up the gas again and again, and it can be made to give whatever pressure is wanted by altering the level of the overflow.

From the washer the gas passes up through the scrubber, and this is supplied with pure water at the rate of 10 to 15 gallons to the ton of Newcastle coal carbonized. This scrubber has the following peculiarities, which I claim:—

Instead of a constant stream of water being run into it, I employ a douch at frequent intervals, which I consider more likely to wet the whole of the material in the scrubber than the same quantity of water run in constantly would, and the trays on which the material lies are of a peculiar construction that again compels a redistribution of the water, as it cannot run through unless where I have designed that it shall do.

The pure water run in at the top of this scrubber comes out at the bottom of 6 to 8 oz. strength, and I prefer to employ about 12 to 15 gallons per ton of coal being carbonized; and to determine this I have recently had a counter connected to the tilting apparatus, which records the number of gallons of water run in, and this is read off and compared with the quantity of coal used.

The liquor thus produced is, along with the other or ordinary ammoniacal liquor produced on the works, run through the washer.

Consequently, there passes through the washer a quantity of ammoniacal liquor equal to about 23 to 25 gallons per ton of coal, and the strength of it on leaving the washer is from 16 to 20 oz.—that is, it will require that quantity of sulphuric acid to neutralize it.

Means are provided for drawing off tar from the bottom of the washer. I am aware that there is an objection in the minds of some engineers to washers, because a washer gives pressure. I disregard this objection, unless where there is no exhauster. I am satisfied that the gas is brought effectually into contact with the water. I, besides, know that such contact deposits whatever tar there may still be in the gas, without which it would not be fit to enter a scrubber. The process, therefore, which I recommend is, wash with ammonia liquor first, and scrub with pure water last.

It has been recommended to wash or scrub with weak liquor, and without pure water. Such a method will not wholly remove the ammonia, as I proved in the experiment with 3-oz. liquor, the gas coming out of the scrubber equally impure as it went in; but when pure water was used, the purity of the gas was immensely increased.

This question of removing the ammonia from gas is one that I have been familiar with so long, that I feel it difficult to speak upon it in any way that assumes the slightest chance of what I say being successfully controverted, that I feel inclined to stop here and listen to what may be said to the contrary.

My connexion with the manufacture of gas commenced with Mr. Croll in 1847. This connexion lasted for ten years, during the whole of which time it was considered a *sine qua non* to purify gas from ammonia; and, from that time to the present moment, I have seen no reason to abandon a single conclusion come to, but to continue improving in the same direction, and during the fifteen years that I have been manufacturing gas, or building gas-works on my own account, I have acted with that end in view. It is, therefore, often a matter of surprise to me to hear and to read what is said and written on this subject by both older and better educated men than myself, who still speak and write on the subject as if it was one yet in the stage of experiment and doubt. I will, therefore, conclude this paper by a few words to those whose works are not of sufficient magnitude to make the process a paying one.

I have several works in my own hands where the ammonia is worthless—either the quantity made is too small, or the works are situate out of the track of buyers of liquor. Nevertheless, *in every case* I extract the ammonia as a duty due to the gas consumer, as well as one that, indirectly, is beneficial to the company whom I represent.

Suppose the manufacture is under 10 millions feet of gas per annum, and the locality badly situate for the sale of liquor in such a case: I assume there is not an exhauster, then I use a scrubber, at such an elevation that the liquor *from* it can run into the ash-pans of the furnaces; for I contend that you have no right, legal or moral, to run it into the ground to poison wells, or into a drain to poison people, or into a stream to poison fish. I believe that there is no necessity for any of those malpractices, and I have no sympathy for any one who does it; it is either a symptom of ignorance, or laziness, to neglect to think out what, under any class of circumstances, may be done with this refuse.

The only difficulty that can arise is the fact of having to get rid of an additional 10 gallons of liquid per ton of coal used. This may be done under the furnaces, on top of the retort-beds with a connexion into the chimney, or by both.

There is, however, another mode, and one which, if not profitable, may, at least, be done with little or no expense even in the smallest case—namely, to erect a good-sized purifier, and put yourselves in communication with some of the manufacturing chemists, who will send you a dry mixture of saw-dust and acid, which you can use in the purifier as you would lime, and when foul it will be received back by the chemist free of expense to the gas company.

There is also another way—and, in my opinion, the most legitimate way—but it is one that will require time to develope—namely, for each gas manager, in his own locality, to set about instructing those ignorant sons of the soil, called the aristocracy, and their creatures, the agricultural classes, into the benefit to be derived from ammonia applied to the soil.

This is very up-hill work, I grant—a species of eighth labour of Hercules, which will give enough to do to the most "muscular Christian." I have tried it, and with very indifferent success; nevertheless, I recommend a trial of it to you.

I know many of you may justly say, "I have enough to do in the multifarious duties of my position to increase them by increasing the volume of my ammoniacal liquor," but the result would be a lessening of duty; for, with the ammonia extracted, you would find the attendance out of doors, and the expense of repairs of meters and brass-work reduced by one-half or three-fourths, the indication of the meters more uniform, from fewer being stopped or changed, and, by consequence, less trouble and more satisfaction with the consumers.

You would, besides, find your purifiers less noxious to the men, and they would not require cleaning out so often. With so many inducements, if there are still any members of this institution who have not had time or opportunity to attend to the question, I am sure you will make a note to return home with the intention to set about it, seeing that it is no longer a moot question, but one that is backed up by every authority competent to advise on the subject.

Mr. LIVESEY (London) said Mr. Anderson had thrown down a challenge to

the engineers of London, but he ought not to forget that his own reputation was made in London, after all. For himself, he was not quite prepared to admit that the London engineers were so much behind their brethren in this matter as Mr. Anderson endeavoured to make out; on the contrary, he believed they were fully able to hold their own against all comers. He was very much pleased with Mr. Anderson's paper, which furnished much useful information, but he felt bound to say that while the writer had been very free in commenting upon London engineers, he had not been generous enough to give them credit for improvements which they had carried out. Their friend, Mr. Mann (of the Blackfriars works), had certainly effected something valuable in the matter of removing ammonia. For years he had removed it entirely by that very beautiful and ingenious contrivance of his—the brushwood revolving distributor. It was a misnomer to call it "Mann's Scrubber," for Mr. Mann had no claim to the use of coke, or coke in layers or tiers, because this had been already employed by Mr. Lowe. The only peculiarity to which Mr. Mann laid claim was the mode of distributing the water in the scrubber. The defect of this apparatus was that it required gearing to drive it. Mr. Mann obtained liquor of 20 ounces strength per ton, and removed the whole of his ammonia. He (Mr. Livesey) did the same, but he did it entirely without any gearing. Formerly he used coke, but had given that up, and now used thin bars of wood, and a common Barker's mill for distributing the water. Instead of a tumbling-box, such as Mr. Anderson employed, and which he had given up because of the noise it made in falling over, and because of the shaking it occasioned in the joints, he had contrived a little box or float, or a spindle, which actuated a valve. Mr. Anderson had quoted the report of the gas referees, but he ought to have stated that that report applied to only about three of the London companies—the Chartered, the Imperial, and the South Metropolitan. All the others were entirely independent of the referees. Their report also was directed more against the old works of the Chartered Company, where for want of space and proper conveniences the company had been unable to remove the whole of their ammonia. But those works were now done away with. As to the question of tar in the scrubber, he liked Mr. Anderson's plan very much. By his own arrangement, however, in which he added something to Mr. Anderson's mode, he had no tar whatever. Instead of taking gas from the water condenser to the exhauster he passed it through a series of very large pipes, so as to bring it to a state of rest. It there had the opportunity of depositing its tar and ammoniacal vapours which were already condensed. That plan had been in use two years, and during that period he had had no trouble at all with tar in the exhausters or scrubbers. The quantity of water he used was from 7 to 10 gallons per ton of coal, and the whole of the ammonia was removed. And here he would say that it was hardly fair to take the quantity of ammonia per ton of coal always, because there were differences in the qualities. He had been told by one manager in the Midland Counties that he obtained from 30 to 40 gallons of 10-oz. strength per ton, whereas he (Mr. Livesey) could not get more than from 20 to 25 gallons of that strength per ton. In the case of his own company, the ammonia in the gas did not average more than 1 grain per 100 feet. He used three scrubbers with liquor, and one with water to finish.

Mr. ANDERSON said Mr. Livesey was an excellent representative of the London gas engineers, and he might say that he knew Mr. Livesey when he hardly knew himself. Mr. Livesey had a father, not a very extraordinary circumstance, but one who had been of very great importance to him. Mr. Livesey, sen., was a man always open to conviction, and ready to welcome everything in the way of improvement? Whenever he met with any one who had invented something which promised to be useful, Mr. Livesey was ever willing to furnish him with the opportunity of developing it, and this often resulted in great benefit to the company of which he was the engineer. And so for many years experiments were made at the South Metropolitan works attended with considerable success. As for the London engineers generally being so exceedingly clever, he (Mr. Anderson) did not believe it. Most of those who were clever were men who had been imported from the provinces; indeed, he did not know what the metropolis would do but for the provincial and Scotch managers. Mr. G. Livesey, it was true, was a London engineer, but he was an extraordinary exception to the rule. It was true, as had been stated, that several of the London companies removed the whole of the ammonia from their gas, and he (Mr. Anderson) did not in his paper intend to throw discredit upon the whole of the companies—his remarks only applied to some. He only wished to call attention to those that were in default, and to let their managers know that he did not believe there was any necessity for building new works or conducting old works with 10 per cent. profits while retaining any ammonia in their gas. Certainly it was not necessary in building new works to have 40 grains of sulphur in every 100 feet of gas. The encomiums he had passed upon them were a piece of good nature, but the fact existed that those works had been badly constructed for the manufacture of good gas. He did not believe that any of the companies, Mr. Livesey's included, removed the whole of their ammonia by means of the scrubbers. They all used oxide of iron in the purification of their gas from sulphur after passing the scrubbers, and he found that if ammoniacal liquor was passed through oxide of iron it was robbed of a large portion of its ammonia. He contemplated, at one time, purifying his liquor from sulphur before making it into salts as one way to prevent a nuisance. He succeeded thus in fixing the sulphur, but in so doing he found that he lost ammonia. There was no doubt that by passing gas containing ammonia through oxide of iron, a part of that ammonia was left behind. So much was this the case that manufacturing chemists were anxious to supply gas companies with oxide of iron free, provided they received the material back again after use, the reason being that they not only recovered the sulphur but a large quantity of ammonia from it. They took care to put into the oxide such substances as would fix the ammonia, and to those companies which did not take out the ammonia for their own use it was a beneficial arrangement, because the gas was thereby improved. He did not think the manufacturers would gain much from him, so far as ammonia was concerned, because he took it out of his gas by the double process of washing and scrubbing. The referees in their report stated, he believed, that Mr. Mann took out the last of the ammonia in the process of oxide of iron purification. With regard to the remarks made by Mr. Livesey about the tilting apparatus—of course, there were many ways of effecting the same object—he preferred it because it enabled him to have a counter attached for recording the quantity of water supplied. Mr. Livesey did not state what was the strength of the liquor he delivered to the manufacturers.

Mr. LIVESEY: It is 10-oz. strength on the average.

Mr. ANDERSON said he did better than that. Mr. Livesey used from 7 to 10 gallons of water per ton of coals. During the last year he (Mr. Anderson) had increased the quantity of water used by him to 13 gallons, and he found the liquor was still quite strong enough for the manufacture of sulphate of ammonia.

The PRESIDENT said, with reference to ammonia purification, they must not lose sight of the fact that some years ago the prevailing opinion was that it was not desirable to take out the whole of the ammonia from gas. It was considered that it combined with the sulphur compounds, and caused them to pass off in a less objectionable form. The present scrubbing arrangements appeared to be perfect for the removal of nearly the whole of the ammonia. As to what Mr. Anderson said with regard to washers, he might remark that washers had been very much used, and he had a great respect for them; but taking what Mr. Anderson stated, that the legitimate object of washers was to remove the tar, he could only remark that it appeared to him this might be done in a much better way. In gas-works, where there was proper condensing power, no portion of tar passed from the condenser to the scrubber. Mr. Anderson had given the meeting a good deal of ammonia, and he (the president) was sorry that a little acid had been added as well. It seemed a pity that he should make the remarks he had done respecting the referees, because, so far as his (the president's) knowledge of the referees went, they were intelligent men, always open to conviction. As to London engineers, all he could say was that he thought too much was expected from them. Almost all inventions were brought out by men in charge of medium-sized works. A man having large works on his hands had very little time for making experiments or for hypothetical reasoning. He thought, therefore, Mr. Anderson had been rather too hard upon their London friends.

Mr. HARTLEY (Westminster) read the following paper:—

COOKING BY GAS.

The persistence—the vitality, so to speak—of prejudice is manifested, probably, in respect to no other useful application more strongly than it is in respect to the employment of gas for cooking purposes. It is still very generally believed that the flavour of the gas permeates the food cooked by its aid, and that a further contamination arises from the absorption by the food of some extraordinarily poisonous compounds which are producable by burning gas alone, and not by any other combustible body. Hence it is that although the advantages of gas for cooking purposes have been proven facts for more than half a century, and although its use has been adopted for cooking in hospitals, many clubs, gentlemen's mansions, public institutions, and places of entertainment, not more, perhaps, than 1 or 2 per cent., at most, of the general body of gas consumers throughout the kingdom so employ it. This state of things is certainly not creditable to the producers and vendors of gas whose business—and it may with propriety be said, *duty*—it is to urge the employment for every really useful and beneficial purpose of the article they produce and sell, not only on the ground of commercial interest (for the extended use of gas for cooking would, especially in summer time, help greatly to keep the mains profitably employed), but on the higher ground of moral obligation towards their customers, who would, in the majority of cases, be vastly benefited by the substitution of gas for fire cooking, both in respect to economy and comfort. The advantages would, of course, be at the maximum in summer time, when the days are bright, long, and warm; when, therefore, the distributing apparatus does the least work, and when there is little or no necessity for keeping fires burning. The writer has said that the present state of things in respect to gas cooking is not creditable to the makers and vendors of gas, and he believes he is perfectly justified in asserting this, notwithstanding that he is perfectly cognizant of the labours of the late Mr. Sharp, of Southampton, and of contemporaries with him, of whom Mr. Goddard, at Ipswich, is an example, and of a number of successors down to Mr. Magnus Ohren, whose little book is the most recent, and who is an ardent advocate for gas cooking, because the writer recognizes the broad fact that gas cooking is not yet popularized, and he perceives that the advocacy of the use of gas for cooking is left far too much in the hands of those who are merely interested in the production and sale of cooking-stoves. Believing that a discussion on this subject by this association will be alike advantageous to producers and users of gas, the writer has, at the invitation of the committee, been induced to prepare this paper; feeling satisfied that it will be kindly and considerately received, notwithstanding that the knowledge of the subject displayed may, and, indeed, must be, far below that of many of the members of this association.

The writer purposes to do no more than open up ground for discussion by a few remarks on the construction of gas cooking-stoves, such as may be used by ordinary consumers—the materials of which they should be made, the kind of burners most suitable, the objections of the public, and, in conclusion, suggest some few arguments which may possess a little originality, and, in addition to those in existence, assist in convincing the incredulous in respect to the advantages and healthfulness of gas cooking. The writer expects in one or two points to be in opposition to the views and opinions of some, and he wishes it to be distinctly understood that he puts his views forward in no spirit of dogmatism. Papers for an association like this should be definite in expression, and it is better for a writer to be wrong and explicit than doubtfully right, for the wrong, when explicitly stated, is sure to be corrected, while the doubtfully right might pass unchallenged because not noticed or not understood.

In respect to construction, leaving out of consideration such large stoves as are used in hospitals, clubs, &c., the writer is of opinion that the oldest and simplest forms of stoves are the best, those which are mere cupboards fitted with a series of gas-jets at the base, and with an outlet tube or funnel near to or upon the top, the stoves being provided with a series of moveable shelves, adjustable as to height, and provided with the means of suspending one or more joints. Reverberatory stoves, with which the vitiated air is discharged at the lower part, the writer does not think well of; they do not perform their work better than the others, if so well; the products of combustion are less easily disposed of, and they are not so convenient and manageable; while he regards those in which an inner chamber is heated by the circulation of gas products throughout a space between the inner chamber and a surrounding pocket as positively disadvantageous, inasmuch as more gas must be required to perform a certain quantity of work, and it is a grave question whether the heated and moist air of the gas flame, when brought into contact with the food, and especially so in respect to meat, does not tend to the better cooking of the same, and the preservation of the juices. Moreover, the brisk circulation through a stove or oven, such as the writer advocates, tends to prevent effluvia of one article of food flavouring another. A common defect in gas cooking stoves or ovens is to make the air openings—especially at the base—too large, so that too active a circulation is kept up, and more gas needs to be used in consequence. The air openings should be capable of adjustment to suit the necessities of consumption, which vary with the articles to be cooked. The rectangular stove is by far the most advantageous, as it is more roomy and more convenient in use; but the shelves should be always self-sustaining when drawn two-thirds out of the oven, so that the two hands of the attendant may be free to remove dishes, &c. A very simple method of rendering the shelf so self-supporting was suggested by the writer to a friend, and put into practice some time since.

As regards the material of which a stove is to be constructed, the writer prefers for small and moderate-sized stoves *wrought-iron*, because the stoves are lighter, cheaper, and more quickly heated up than cast-iron ones, or stoves of porcelain or fire-clay. If the stoves are double-bodied, with an air-space between the inner and outer parts, after the fashion of stoves constructed some years ago by Mr. Geo. Garnett, when at Portsmouth, or covered with a jacket of wood, after the style of the admirable stoves constructed by Mr. Sharp, so much the better, but these additions render the stoves more expensive.

As regards the kind of burner to be used in a gas cooking-oven, the writer is in direct antagonism to the generally received notion that the Bunsen—that is, the burner in which the gas is mixed with air before combustion—is the best. It is a common mistake, although it may be one into which none of the members of this association have fallen, that gas burned from a Bunsen burner yields more heat than when burned from an ordinary burner. It does no such thing, although it is true that, under circumstances such as will be mentioned presently, more heat may be utilized when a Bunsen burner is employed, but this cannot be the case in an oven. In proof of this position, the writer may mention some experiments which he made in cooking. Two burners were made to fit the same oven, one burner being of $\frac{1}{4}$-tube, on Bunsen's principle, and the other a $\frac{3}{4}$-tube, with simple jet-holes. Two joints of meat and other articles of food, of the same weight and character respectively, were cooked in turn by the aid of each burner, and it was found that the same quantity of gas, as measured by a test-meter, was used in each case. To confirm these results, a delicate thermometer was suspended in the oven, so that it could be observed

from the outside, and it was found that, for equal consumption of gas, the temperature was raised through the same number of degrees in equal times, until, in each case, the thermometer indicated 410° Fahr., at which point it remained stationary.

Another notion which the writer is disposed to believe to be erroneous, although he is not prepared with demonstrative evidence in support of his belief, is that with the Bunsen burner a more complete combustion of the gas is effected than with the ordinary jet. The writer has noticed that the effluvia from gas burned apparently in a proper manner from a Bunsen is sometimes much more offensive than the effluvia from the same gas burned under ordinary conditions, and this has led him to doubt whether the Bunsen approximates in its effects to the rendering of a combustion relly perfect. This is a question, however, upon which the writer bases no argument. The great disadvantage of a Bunsen burner, in an oven especially, is that the range of temperature producible is so limited; you must have a great heat or none at all, for if the gas be turned low the flame flies back to the source of supply, no useful heat is evolved, and intolerable and suffocating fumes are given off, owing to the imperfect combustion of the gas. With the jet, fishtail, or bat's-wing, the gas may be burned at almost any rate of consumption; hence food may be kept simply hot, if desired, and the oven, if kept bright and clean, may even be made available as a drying or airing closet.

For boiling purposes the Bunsen burner is to be preferred, because the bottoms of the vessels can be kept clean, and there is no smoke given off. As far as economy in gas consumption is concerned, there is not much to choose between a Bunsen and a bat's-wing. Some experiments which the writer has made show that 16 cubic feet of gas would raise a measured quantity of water in an open pot from 52° Fahr. to 180°, when burned in a Bunsen upright burner with the flame in contact with the bottom of the pot, and that 16·4 cubic feet sufficed to raise the same quantity of water to the same temperature when the gas was burned from a bat's-wing with the tips of the flame just touching the bottom of the pot; the per centage in favour of the Bunsen being only ·025 per cent. With the bottom of the pot 2 inches above the top of the respective flames, the advantage was decidedly on the side of the bat's-wing burner.

The objections against cooking by the aid of gas are, as far as the writer's experience goes, something like the following:—

1. That gas is a very noxious compound, and when burned yields products different in character and more prejudicial to health than coal or coke fuel does.
2. That the gas and the products of its combustion are capable of flavouring and contaminating, and do flavour and contaminate, the food cooked by its aid.
3. That cooking by gas is quite as troublesome and not more economical, in any sense, than cooking by the aid of an ordinary fire.

Against these objections the writer would urge, as he has on many occasions urged—1. That gas is composed of precisely the same elements as coal—namely, hydrogen, carbon, sulphur, oxygen, and nitrogen; and these elements, when combined in the form of coal or in the form of gas, on combustion in air or in oxygen, yield exactly the same products—namely, water, carbonic acid, sulphurous acid, and nitrogen, with perhaps minute portions of nitric acid, which is producible when a mixture of hydrogen and nitrogen is burned in air or oxygen, so that gas and the products of its combustion can by no possibility contain anything more hurtful than coal or the products of its combustion. The argument may be carried much further than this, however. The only real impurity in coal and in gas is sulphur, which exists in coal as pyrites, and in gas, as delivered to the public, as sulphides of carbon. Now, the best Newcastle house coal contains about 1¼ per cent. by weight of sulphur, and some of the cheaper coal very much more. One highly pyritic sample which the writer analyzed, contained as much as 7 per cent., so that it will be fair to assume that the average for house coals is not less than 1¼ per cent. Admitting this to be the case, then, 1 pound of coal will contain 105 grains of sulphur, which in burning yields 200 grains of sulphurous acid. One pound of gas of the gravity of ·410 would measure 34·4 cubic feet, and assuming that the gas contained *three* times the quantity fixed by Act of Parliament a few years since (20 grains per 100 cubic feet) as the maximum for sulphur impurity, or 60 grains, then 34·4 cubic feet would contain 21·6 grains of sulphur, and yield only 43·2 grains of sulphurous acid. Of the other products of combustion—viz., water and carbonic acid, gas evolves more of the first, which is perfectly innoxious, and much less of the second; for while 87 per cent. of ordinary house coal consists of carbon, coal gas, according to Lewis Thompson, contains only 72·1 per cent. by weight. So that 1 lb. of coal contains 6090 grains of carbon, which, on burning, is capable of producing 22,330 grains of carbonic acid, while 1 lb. of gas contains 5047 grains of carbon, capable in burning of producing 18,507 grains of carbonic acid. This statement does not, however, represent the true relations of coal and gas; their respective heating powers must be taken into account. It is easily proved by Thompson's fuel test that 1 lb. of house coal will raise 967 parts of water through 8° Fahr. of temperature, and the multiplication of these numbers together gives 7736. In other words, it may be said that 1 lb. of coal will at best raise no more than 8000 lbs. of water through 1° Fahr.

Dr. Letheby, in agreement with the experiments of Mr. F. J. Evans, stated in the valuable lecture delivered to this association in 1866, that 1 lb. of ordinary coal gas will raise 21,060 lbs. of water through 1° Fahr. of temperature. So that, in round numbers, 13 cubic feet of gas will produce as much heat as 1 lb. of coal. In respect to sulphurous acid, the gas would produce only 16½ grains, as against 200 for coal; and of carbonic acid gas would produce 6830 grains, as against 22,330 grains. It may fairly be said that a single down draught would cause more of these gases to pass over a joint roasting in front of a fire than it would be exposed to during the whole time of cooking in a gas-oven, and that a chop or steak cooked over a coal or coke fire is exposed to vastly more of these gases, but no person ever appears to have suspected that the meat would be contaminated, or the eater thereof be poisoned; certain it is that medical history fails to record any such extraordinary and lamentable result. The actual fact remains to be pointed out in respect to these gases, which is that, although they are injurious to enhale, and even quickly destructive of life unless largely diluted with air, they are quite harmless in any action on food, and that one of them—carbonic acid—is a necessary ingredient in water, beer, aërated fluids and bread, and is actually beneficial when taken into the stomach.

In respect to the second objection, it may be easily shown that food under the influence of a high heat, and especially of a circulating heat, is really indisposed or incapable of absorbing gaseous fumes or vapours. All articles of food, especially those which are cooked by roasting or baking, contain coagulative matters, such, for instance, as albumen. Albumen coagulates at about 150° Fahr., so that a joint is no sooner exposed to a roasting heat, which is from 300° to 400° Fahr., than its outer surface becomes coagulated and practically impenetrable by gases; in addition to which steam is generated within the viands, and this is projected with so much force that it effectually repels the entry of anything else. True, in a close oven having no air circulation, there is a sort of general flavour communicated to meat, but the writer believes the contamination, so to speak, is confined to the surface, and is due to the complete saturation of the expelled juices, and the adhesion of a small portion of their coagulative matters as they flow over the joints, which effect is much more likely to ensue in the comparatively dry atmosphere of a close oven than in a gas-heated one.

As regards the first part of the third objection, it is sufficient to say that with gas there is no time wasted in the making, and waiting for a fire to burn up, and the labour is nothing. The gas has only to be lighted and adjusted, the food put in the oven, and it may be so nicely timed, with very little experience, as to require no attention until it is done, and needs taking out. As to economy, Mr. Ohren's experiments, which are quite concordant with others made by the writer, show that the cost of cooking joints of equal weights is on the average 2$\frac{37}{100}$ths pence with gas, and very nearly 4d. with coal, while the absolute waste or loss of weight is twice as much, at least, with fire cooking than with gas cooking. Even if the fire be utilized for boiling purposes, and gas be used for both roasting and boiling, the writer found that gas was by far the most economical in relation to the weight of the food cooked.

The writer's experience also leads him to the conclusion that in cooking vegetables, puddings, &c., it is far more economical, on most occasions, to effect the cooking by steam, than to employ the gas directly for boiling.

The writer may mention a useful hint of the late M. Soyer, the great cook, to preserve the juices in boiled meat and ensure its tenderness: "Dip it in boiling water for a few minutes and then immerse in cold water, and raise it to the boiling point, and simmer until cooked." Apply this idea in gas roasting; raise the gas high for a short time, and then adjust to the requisite consumption. In each case, coagulation of the surface is effected, and the juices are imprisoned, or, at all events, in roasting the surface is coagulated more promptly.

The writer thinks that the facts and reasonings which he has adduced certainly show that gas, as applied for cooking, is, in comparison with other fuel—

1. More healthful.
2. More certain.
3. Less troublesome.
4. Less expensive.
5. Less wasteful, by loss of weight.
6. Less costly, unless, indeed, the waste heat from a necessary fire be employed.

While, lastly, it certainly is—

7. Much cleaner.

Mr. OHREN (Sydenham) said he had paid some attention to gas cooking, and differed with the writer of the paper on one point. Mr. Hartley stated that gas-stoves made of plain sheet iron answered for all purposes of cooking, and that he saw no benefit in using porcelain plates. When these stoves were originally made, plain iron plates were always employed in their construction, and when he (Mr. Ohren) first commenced to use them he found there was a great nuisance from the smells which escaped in the course of cooking; this he ascertained arose from the grease—from the spurting of fat in the joints—getting on to the plates, where it became burnt; when porcelain plates were employed no such unpleasant smells occurred. The reason why he preferred an atmospheric to an ordinary burner in these stoves when common gas was used was that occasionally the cook would turn the gas on too high, and not only smoked the stove but also the joint, which gave it a very unpleasant flavour. This carelessness on the part of cooks no doubt gave rise to the idea that cooking by gas was injurious to the meat. With an atmospheric burner there was no smoke. It was true, as Mr. Hartley stated, that there was occasionally a very bad smell from the atmospheric burner, but that arose from the same cause—viz., that of allowing too much gas to pass through it. When an atmospheric burner was turned up too high there was not a proper combustion of gas; the portion unconsumed escaped, and of course there was a smell from it. On this account it was that he advocated the use of a regulator in gas cooking-stoves to adjust the burners to the exact consumption required. If regulators were adopted there would be no complaints of smells or nuisance of any sort, nor would any pipe be required to carry off the burnt products. Gas engineers ought to pay very careful attention to the stoves they supply, and consumers to see that they were properly constructed and fitted up; if they did so, cooking by gas would be rapidly extended. It was wonderful how little knowledge there was amongst gas consumers as to the benefits to be derived from the use of gas for cooking. Gas-stoves had been known for a long time amongst professional men, and had been employed in some localities perhaps more than in others, but the general public seemed to know nothing about them. His experience was that whenever they were properly introduced by gas companies the consumers readily availed themselves of them. In connection with his own company he had turned his serious attention to the subject, and had sent out a large number of cooking and heating stoves, which had given great satisfaction to the consumers.

Mr. METHVEN (Bury St. Edmunds) said neither the writer of the paper nor Mr. Ohren had touched upon the great objections to gas cooking. According to his own experience these might be regarded as two-fold; first, the cost of the stove, and secondly, the cost of the gas. Mr. Ohren had certainly indicated one method of surmounting the first objection—viz., the letting out of gas-stoves on hire by gas companies at a moderate rate; but the second objection was unremoved. He usually found that if the person who had charge of the apparatus was not the person who paid for the gas, it was extravagantly used, so that it was found very expensive even to heat a large quantity of water by means of gas. He had known an instance in which that objection had been remedied by affixing to each gas-stove a separate meter, and letting the cook know that he or she was responsible for the excess of gas consumed. He regretted that Mr. Ohren had given utterance to so heterodox a sentiment that in any case there was no necessity for a flue to a gas-stove. He (Mr. Methven) believed it was always necessary, and that the absence of any arrangement of the kind had caused much annoyance and trouble to those who used the stove. The products of combustion must go somewhere, whether an air burner or an ordinary burner were employed; and he was sure it was a great mistake to recommend a gas-stove for cooking purposes without there were the means of placing it under a chimney, or a flue leading directly into a chimney.

Mr. GODDARD (Ipswich) said he had perhaps had as much to do with gas cooking as any gentleman in the room. He was induced to devote his attention to it chiefly with the view of getting a daily consumption of gas in the town, so as to make the mains profitable by day as well as by night. Accordingly he advised the company he represented to supply gas-stoves, and all kinds of gas apparatus to the consumers, both for heating and manufacturing, as well as for baths, at a moderate rental. The arrangement was carried into effect, and had answered exceedingly well for a long period of time. He believed he was the first to introduce porcelain tiles into the construction of cooking stoves, about 25 years ago, and he did it for this reason—that porcelain being a better non-conductor of heat than metal, he thought there would be an economy in this respect, and, as it was very cleanly, it would avoid the unpleasant smells which were created of grease upon the hot metal plates. The plan adopted at Ipswich was for the company to supply the fittings and apparatus, and to do the work of fitting up, charging the consumer 10 per cent. upon the cost price. The great difficulty which had always attended gas cooking was the imprudent use of the gas by the domestics. He once fitted up a gas-stove to cook for 300 people, but the consumption of gas was found to be so large that the proprietor of the establishment felt that he must abandon its use. He (Mr. Goddard) recommended him to have a meter attached to the apparatus itself, and to offer an inducement to the person who had the management of the stove to reduce the consumption to its minimum amount. The plan succeeded admirably; day by day the register of the meter was taken and an amazing economy was effected. When the proprietor imagined that he had reached the minimum consumpton, he made a very handsome offer to the cook that for all gas saved beyond that point he would give him an equivalent amount. The consequence was a still further and very considerable reduction in the consumption, because the gas was not allowed to burn when there was nothing to be cooked. He

(Mr. Goddard) believed the only real difficulty which gas managers had to contend with in extending the use of gas-cooking apparatus, was the want of care on the part of those who used it.

Mr. JONES (Dover) said there was one objection not yet touched upon by previous speakers—viz., the necessity of having additional pressure on during the day time, and the consequent additional leakage sustained by gas companies supplying cooking stoves.

Mr. WARNER (South Shields) said some years ago a similar experiment to that recently made by Mr. Ohren was attempted; a pamphlet was got up and circulated, gas cooking-stoves of a novel character were devised, and a dinner arranged, to which the mayor and some members of the corporation, with the representatives of the press, were invited. They all partook very heartily of the banquet and enjoyed it much, and, as might be supposed, pronounced a highly favourable verdict on the plan. The system was adopted, and he did not think there was any alteration made in that instance in the pressure for the purpose of cooking apparatus, but this result arose from their introduction—viz., that during the first quarter after the introduction of the stoves, a very large additional quantity of gas was consumed—some hundreds of thousands of feet. He believed that wherever the plan was introduced this would be found to be the case, and the company would have a large part of their apparatus now lying idle during the summer months profitably employed. This was a very useful subject to be introduced for discussion at the meetings of the association, and he hoped all the members would derive advantage from it.

Mr. IRONS (Gosport) said he believed that at Bath the committee did put on extra pressure for certain houses where cooking-stoves were in use. At Gosport, one of his customers had a stove of this kind, and was rather dissatisfied with the supply of gas he obtained for it. Being a shareholder of the company, however, he was induced to remedy his complaint by enlarging his fittings. When he (Mr. Irons) was engaged in the suburbs of London, there were 400 or 500 cooking and warming stoves used in his district in private houses, whitebait taverns, and for greenhouses. There being great objections to chimneys for outbuildings in the neighbourhood, ordinary greenhouse stoves could not be used, and gas was employed for heating purposes. The one great difficulty which gas companies had to deal with was, the necessity for extra day pressure. If a sufficient number of consumers could be got to use them, if there were not such a prejudice against gas companies, and if people could be induced to follow the advice of managers, in having efficient fittings, the ordinary day pressure would in most cases be enough.

Mr. ANDERSON (London) thought the members were under obligation to Mr. Hartley for bringing this subject before the meeting. It was a practical question in which all present were interested, and upon which very much of the success of their undertakings depended. Almost all the difficulties to which they were exposed in reference to gas cooking arose out of the ignorance of the public or the prejudice so commonly felt against the adoption of anything new. He quite agreed with Mr. Ohren that in some cases a gas-stove might be fixed without a chimney, but that must only be where the ventilation was good, otherwise the products of combustion would necessarily become a nuisance. It required discretion and judgment on the part of gas managers in deciding what should be done, and in providing artificial ventilation where the natural ventilation of the place was inadequate. The adoption of gas-cooking apparatus would be a gradual process, and they must not expect consumers to be converted to it all at once. As to the necessity for increased pressure, of course, if it was desirable to encourage the use of gas-stoves, this must be provided, and if this resulted in increased leakage, it would make managers look out more sharply to detect it. At a place in Ireland where the works were under his control he had been called upon to supply gas to a milk condensing factory for the purpose of soldering the cans in which the milk was stored. The apparatus employed was a hot plate with a groove in it, which was filled with solder, and a nice even heat was required in its use. In that town no day pressure was given, but as it seemed to him desirable to encourage this branch of industry he resolved to try what could be done. Pressure was put on, the main-valve to the town was closed, and during the whole of the day the gas was passed through a meter. His experience then was that the leakage was very little indeed, and the supply was continued in a most satisfactory manner.

Mr. BROADHEAD (Grimsby) said he had some experience with this kind of apparatus in Leeds some years ago, and his experience was that on account of the smallness of the consumers fittings and the carelessness of servants in burning the gas when no cooking operations were in progress, that which ought to be an economical arrangement was a very expensive one.

Mr. OHREN said with cooking apparatus in use in his district the pressure on the mains was only five-tenths. With respect to burners, it should be always borne in mind that there should be a sufficient number for the quantity of gas required, and that they should not be turned up too high. Instead of having a small ring of jets, and burning them at their maximum capacity, it was better to have a large ring and burn them at a moderate height. If this were carefully attended to, there was no more need for a chimney with a gas-stove than there was for a chimney over the burners in a room.

Mr. JOHNSON (London) said he had had great experience in gas consumption for cooking purposes. In the City of London district there were hundreds of these stoves in daily use, some which consumed 3000 or 4000 cubic feet of gas per day. He had always found the same objection which had been spoken of—viz., the expensiveness of the process owing to the carelessness of servants. A friend of his had just invented a small apparatus by which he made the joint of meat turn the gas on to the proper height. It acted directly by a lever on the cock which supplied the gas, and when the joint was taken away, the act of removing it turned the gas down to a small blue flame. By this means it was put beyond the control of the servant altogether. A similar arrangement made the removal of a saucepan turn down the gas beneath it until it was wanted again. This apparatus was also applicable to tailors heating apparatus and for soldering irons, and every description of burner used for heating purposes. If gas engineers would direct their attention to this arrangement, he thought they would be able to induce people to use gas much more generally than they had hitherto done.

Mr. HARTLEY, in reply, said that he was happy that the subject of gas-cooking excited so much interest, and that those gentlemen who differed from him on certain points had so frankly spoken. Mr. Methven stated that the principal reason why gas cooking-stoves were not more widely used was that gas cooking was costly, owing to the extravagance of servants, who would waste the gas. He (Mr. Hartley) had experienced something of this waste, but the fault was not in the gas—other fuel was also wasted by servants, and it certainly would be quite as reasonable to find fault with the coal merchant as with the gas-maker. Gas-makers could teach people how to use cooking apparatus, and then leave them to make the proper application of the fuel. In dealing with cooking in the paper, he (Mr. Hartley) had of course addressed himself only to the relative value of each agent when properly used. Gas-stoves were made of various materials, and opinions as to the advantages of each would differ. Porcelain plates were certainly clean, and possibly, as Mr. Goddard said, there was less radiation externally, but these plates could not be entirely disassociated from iron frames, and in spite of all care in fitting, there was a liability for the grease to get on to the iron, and then some unpleasant smell would be produced, although perhaps not to the same extent as with simple black iron stoves. He (Mr. Hartley) preferred tinned iron for the body; it stood well, was cleaner than untinned iron, and gave off much less of objectionable fumes when the grease came into contact with it. With respect to burners he adhered to the preference he had expressed for the ordinary jet or fishtail. Mr. Ohren said these gave rise to smoke, and that when governors were used with the atmospheric burners, there was no difficulty attending their employment. Well, governors could be used with the ordinary burners just as readily as with the atmospheric, and smoking thereby be prevented. In fact all gas-ovens should be supplied with gas through governors. In respect to day pressure and its increase, that was a matter for experience. In London and many large towns, no increase of day pressure is needed for cooking purposes, because the companies are obliged, under Act of Parliament, to keep up sufficient pressure in the day time, and no doubt a similar obligation will be imposed on most, if not all the gas companies in the kingdom, and it would then become a question of utilizing what is given. He (Mr. Hartley) begged in conclusion, to thank the president and the members for the courteous attention they had given to him.

Mr. G. LIVESEY read the following paper:—

THE HYDRAULIC MAIN.

The title of my paper is rather wide and indefinite, but as the interest by general acknowledgment attaches more to the discussion than the paper, and the subject being one on which so much can been said, I think in so wording the title that members cannot well be out of order in speaking on it. I shall make an opening for remarks that may be very valuable, though I intend confining myself strictly to a description of a difficulty and to a means of successfully preventing its occurrence.

The old-fashioned D-shaped main, with a bridge at every length to keep the seal at the proper level, in the event of any alteration of level in the whole length of main, seems to have been specially contrived to retain the thick tar and convert it into pitch, to be removed once a year or oftener by taking off the covers and digging it out after having with great labour broken it up with clinkering spuds and chisel bars.

The substance thus removed consisted of a mixture of pitch or very thick tar, and crystals of muriate of ammonia conglomerated into a very solid mass, and which filled the main nearly to the water level, with a small basin or cup as it were under each dip-pipe, just allowing the gas to pass—this cup being in fact formed by the passage of the gas, but instead of having a free passage the resistance in time became so great as to produce a tendency to frequent stoppage of the dip-pipes.

Various means have been tried to prevent or clear out this accumulation of thick tar, one being an enlargement of the hydraulic itself till, in one case that I have seen, each length would make a small Cornish boiler; then the elevation of the hydraulic from two to four or five feet above the brickwork with the object of removing it beyond the reach of heat—it being considered that the heat from the setting converted the tar into pitch. A stream of gas liquor has in some cases been caused to flow through the main, and for a long time I had a quantity of hot water from the steam-boiler put into the main once or twice a week; but this did very little permanent good. The making the main deeper and square at the bottom has been suggested, means for drawing off the tar from the bottom instead of the top have been devised and used with varying success, but by no plan, so far as I am aware, has the prevention of this accumulation been certainly and completely attained.

The causes of its production are twofold: first, the retention of the tar in the main; and second, the heat of the gas from the retort in passing through this comparatively stationary tar evaporating its volatile constituents; for *it is the hot gas and not the radiated heat from the setting that does the mischief.*

If, therefore, one of these causes could be removed, a good result would be obtained by reducing the temperature of the gas before it reaches the main (this has been done by Mr. Morton, of the London Company, by lengthening the ascension-pipes), or carrying away the tar immediately it is deposited, or by keeping it in motion, and not letting it be a sufficient time in contact with the hot gas to volatilize its lighter constituents. On thinking over this matter I asked myself—What is the use of that large space below the bottom of the dip-pipes? It is certainly not required to allow the gas to pass, for the gas does not extend 2 inches, if an inch, below the edge of the dip-pipe; consequently, the heavy tar sinking to the bottom is never disturbed. It then occurred to me to put a false bottom in two of the mains at the South Metropolitan works; this was done by means of a plate of 10-gauge sheet iron, dished to the extent of 2 inches, placed so that in the centre it was just 2 inches below the bottom of the dip; the area of the main above the bottom of dip was therefore not reduced; the space below the false bottom was filled up with sand. I considered that the false or shallow bottom, having a smooth surface, the tar would not be so likely to adhere; seeing that the bubbling through of the gas would always keep the centre disturbed, and thus produce a circulation from the centre to the sides. The result exceeded my expectations, for after a winter's working I had the covers taken off the hydraulic in several places when the whole of the beds had been some time out of use, and the tar had had a chance of becoming cold and stiff; I found it in a perfectly fluid state.

The next summer I had nearly the whole of the hydraulic mains fitted in this way; in one division of the retort-house a new main, of the section shown, was put up in place of the old sort, and but one length of main, having a 2-inch perforated pipe laid along the bottom, through which water from the steam-boiler could be sent, was left without alteration. I had therefore last winter an opportunity of thoroughly testing the plan, and with again the same result, the tar perfectly fluid, no pitch or thick tar, and no crystals or ammonia, and better still in the whole of the mains with the shallow bottoms I might almost say *there was not a stopped dip-pipe all the winter;* and *stopped ascension-pipes were of much more rare occurrence;* in fact, though I often made the inquiry of the foremen and other men, I always got the reply that *they had no trouble with them.* In the length of main fitted with the *water-pipes* the dips *stopped as usual.*

The form of main (see section) I now use is much lighter, because smaller than those used formerly, though the area for water is the same; there is, therefore, a *saving in first cost. Another considerable saving* results from the gas passing the seal with much greater freedom, the *cost of cleaning* dip-pipes is saved, and consequently the retorts work constantly, and the very dirty and expensive job of cleaning out the main periodically is avoided. I think the thing was worth a patent, but had I protected it, I should not have appeared before you to describe my invention. It is, after all, a small matter; but if it be an improvement, and one that will relieve gas managers to some extent of one of their anxieties or annoyances (and they have their share of these now-a-days), they are very welcome to its use; and if the idea is really new, and not, as is quite possible, been tried before, let me ask you to speak of it as the "Livesey Hydraulic."

Mr. BARRATT (Accrington) asked what was the height of the hydraulic from the top of the bed.

Mr. LIVESEY said, 18 inches.

Mr. BARRATT wished also to know the height of each pipe from the top of the retort.

Mr. LIVESEY said, about 10 feet. The dip-pipe extended about 2 feet above the top of the hydraulic.

Mr. OHREN asked whether Mr. Livesey found 2 inches dip in the hydraulic was sufficient, and whether, if he had made the dip-pipe longer and brought it nearer to the bottom, he would not have had an advantage by obtaining a greater gas-way from the main?

Mr. ANDERSON said he did not gather from Mr. Livesey what was the chief object in making the alteration, unless it was the saving of the necessity for

cleaning out the hydraulic main and the avoidance of stopped pipes. But for himself, he did not know that it was a necessary condition of making gas that they should clean out the hydraulic, or that they should have stopped pipes. The cause of the latter was that the heats employed were too great, so that the naphtha, which had been in the gas in a state of vapour, was volatilized out of it, and that the tar in the gas was converted into pitch in traversing the pipe. It did not matter how large the pipes were, for if the heats were very great, a stoppage must be the result. He had tried pipes of 8 inches diameter, and all the difference was that they did not stop up so quickly as those of 4 and 5 inches diameter. With reference to the suggestion of Mr. Livesey, there was one advantage in it, that it was not necessary to have so large a hydraulic, and therefore it was more economical. But he thought that with the dip-pipe so near the bottom of the main there would not be so free a flow for the gas. By the mode suggested the tar would be caused to flow away faster, and would not be allowed to accumulate.

Mr. MILES (Deane) thought Mr. Livesey was recommending them to do something they were advised last year not to do. At the meeting in Dublin Mr. Somerville recommended managers to have square, or rather, rectangular hydraulics, and that recommendation was received with great favour. Another thing they had been taught was to have as much room in their apparatus as possible. But according to Mr. Livesey's suggestion they would be contracting it. Why not go back to the 15-inch circular hydraulic? Or why should not Mr. Livesey carry his dip-pipe 4 or 5 inches lower instead of making his hydraulic shallower? He (Mr. Miles) could not see the advantage to arise from the alteration in any way.

Mr. IRONS (Gosport) said the subject of the hydraulic main was a very important one, and he should like to ask a question of Mr. Livesey. In his paper Mr. Livesey alluded to the stoppage of the dip-pipes, but said nothing about the ascension-pipes. Now he (Mr. Irons) quite agreed with Mr. Anderson that the stoppage of the latter arose from the heat from the retort. If a manager had leaky retorts and was using an exhauster, he would find that these were the pipes to stop soonest. What he wanted to ask Mr. Livesey was, whether, presuming an exhauster was used, he ever had a back action? also, if the space between the bottom of the dip-pipe and the false bottom of the hydraulic was equivalent to the area of the dip-pipe, or whether he had to use more exhausting power to keep the same vacuum in the ascension-pipes?

Mr. MEAD (Reigate) said he was afraid some of those who had spoken had not grasped the theory of Mr. Livesey's invention. With reference to the distance of the bottom of the dip-pipe from the bottom of the hydraulic, that must depend upon the size of the latter. If the dip was a 4-inch pipe he must have 1 inch from the bottom of the hydraulic to allow the whole of the gas to pass. The advantage of the proposed plan was that instead of allowing the tar to remain idle in the dip and the main by reducing the depth, he caused the whole of the tar to flow away. So far he thought this was an improvement.

Mr. SIMPSON (Rugby) asked whether Mr. Livesey had ever tried taking away the tar from the bottom of the hydraulic main. His experience was that by taking the thick tar as deposited from the bottom of the main the whole difficulty was removed.

Mr. LIVESEY said he had been pleased with the observations offered upon his paper, and would briefly reply to the suggestions which had been made. As to the question about the longer dip—had he lengthened the dip it would have reduced the available area of water for the seal. In old D-shaped hydraulics, it was simply half a circle, starting from the level of the bottom of the dip, and if he had brought the dip down to within two inches of the bottom, there would have been but a very small space of water to seal it, whereas by putting a false bottom at the level which he adopted, he retained the whole of the water level for the seal. As to the gas-way—he thought he had certainly left enough for any number of retorts. With reference to stopped ascension-pipes, Mr. Anderson was quite right in what he said, but he (Mr. Livesey) thought he could throw a little light upon the subject. Probably every one present remembered the instance of a large company who erected their works with one ascension-pipe only to their retorts, the result being a complete failure. He had himself tried a little experiment to determine the matter. He adopted one downward pipe from one end of the retorts, and had the ordinary ascension-pipe from the other. On some occasions he passed the gas one way, on others the reverse way, and he found in both cases that the pipes became in eighteen hours completely stopped up with hard stuff like iron. He came therefore to the conclusion that it was the heat of the gas which caused the carbonization of the tar, and converted it into this solid coke. When gas was taken from the two ends of through retorts, half the gas went up one ascension-pipe, and half up the other, and each half of the gas travelled one quarter of the length of the retort, but if the gas was taken from one end, one half travelled over three-quarters of the length of the retort, and the other half over a quarter only. In this way the heat imparted to the gas in passing over the whole of the hot coke, caused so much heat in the ascension-pipe as to carbonize the whole of the tar. Supposing that in an old main there was a collection of this thick stuff which caused considerable resistance to the passage of the gas, if the other end was tolerably clear, the whole of the gas would pass in that direction, and in the course of a day that end also would be stopped up. But by taking care that the tar was always perfectly fluid, there was an equally free passage on each side. As to the question about making the hydraulic smaller, he thought he had already answered that, and he need only add that the object of making the bottom square and deeper was, that there should be more room for the thick stuff to accumulate, and no need to clean it out frequently. But if the accumulation could be prevented altogether, it was far better than having to remove it. His dips were 4-inch pipes, and the reason why he did not have them 2 inches below instead of 1 was, that he thought the bubbling of the gas through would keep the stuff in motion, and that if he had it nearly flat and only 1 inch below, there would be no tendency to slide down towards the centre, whereas with an incline and 2 inches, it would flow down. He started with his curve at a level with the dip-pipe. With respect to Mr. Simpson's inquiry, he might remark that he had not tried the experiment of taking the tar away from the bottom of the hydraulic. Some of his friends had done so, at times succeeding, and at others failing. The plan which he had adopted did succeed so far, and it was only a few days previously that he found on removing the cover from a main with a false bottom, that he could stir the stuff about with a stick like the ordinary tar about the place.

At the Afternoon Sitting Mr. R. FISH (Hornsey), read the following paper.

ON THE COMPARATIVE COST OF PURIFYING GAS BY LIME AND OXIDE OF IRON.

Mr. President and Gentlemen,—Having been invited to read a paper before you, I beg to draw your attention to a subject which, so far as I know, has never been discussed at these meetings—I mean the comparative cost and advantages of purifying by lime and by oxide of iron, together with the revivification of the latter.

And, although I cannot boast of having charge of very large works, which might lend an air of authority to what I am about to state, I may say with confidence that I have given considerable attention to the subject, and this it is that makes me less reluctant to address you than I otherwise should be.

With reference to lime, I think there is no one but will admit its worth as regards its purifying merits, but the great inconvenience felt by the accumulation of it, and therefore its liability to create a nuisance, together with an increase of cost, have caused the use of oxide of iron to become more general of late years, for it must be borne in mind that what with our Government inspectors, our local boards, and a great number of others, whom we might well term nuisances, it is manifestly to our advantage to reduce any additional nuisance to a minimum, especially as the abatement of it tends to the comfort and convenience of all concerned.

As regards oxide of iron, it is well known that in its fresh state it freely absorbs the sulphuretted hydrogen of foul gas, thus forming the black sulphide of iron; this, when exposed to the atmosphere, deposits its sulphur, and by the absorption of oxygen becomes converted again into oxide of iron. The sulphur which it had before taken in as sulphuretted hydrogen is thus set free among the particles of the oxide, which, by a succession of foulings and revivifications, become so charged and clogged with inert sulphur that the air loses the power to restore it; even then the spent oxide has its value, and my firm conviction is that when the sulphur compounds become more widely known competition for the spent material will further increase its value.

I cannot argue that oxide of iron has no drawbacks, although it is unquestionably cheaper than lime, but in the course of revivification it gives off unpleasant vapours, and the cost of labour for its frequent removal from the purifiers is very considerable; it is to this important matter (namely, the cost of labour in the revivification of oxide, and the reduction of what in some situations might be considered a nuisance arising therefrom) that I am more especially anxious to draw your attention presently.

As to the saving effected by the use of oxide (with a small portion of lime to take up the carbonic acid), I find after taking the labour connected with oxide into consideration, there is from 40 to 50 per cent. in favour of oxide, but few agree as to the exact cost, this varying according to the price of both materials, the consumption of gas, the adaptation of the oxide and lime houses in proximity to the purifiers, and the means adopted for taking out the oxide and refilling the purifiers.

In order that I may explain the matter more clearly, I will give you the precise cost of purification and labour by the two processes which have been used in the works over which I have the charge.

In the year 1868 our consumption was 10,191,000 cubic feet of gas, and we used for purification—

	£	s.	d.
62 tons of lime, at 16s. 3d.	50	7	6
Labour, cleaning and refilling purifiers	5	13	3
	£56	0	9

Average cost per 1000 cubic feet, 1¼d. and ⅓.

This sum, I felt, was too much, and should be reduced; and having experienced, as I have already stated, the nuisance arising from foul lime, and being almost prohibited from removing it from the works, I saw the necessity of resorting to the use of oxide of iron and lime, the result of which was as follows:—

In 1869, 1870, and 1871, our consumption was 53,256,000 cubic feet of gas, for the purification of which we used—

	£	s.	d.
500 bushels of Hill's oxide, at 1s. 9d.	43	15	0
53 tons of lime, at 16s. 3d.	43	1	3
Labour, cleaning out purifiers	125	16	4
	£212	12	7
Deduct value of spent oxide	45	0	0
	£167	12	7

Average cost, ¾d. per 1000 cubic feet.

The method which I am about to explain has been in use at the Hornsey Gas-Works for more than five months, and is one that I have thought of sufficient importance to obtain "provisional protection" for. The plan adopted is thus—I provide the purifiers with an inlet and outlet, independent of the inlet and outlet for gas, and each inlet is furnished with a valve, to which is attached a short, open, and somewhat funnel-shaped pipe. Within the mouth of this pipe a nozzle (in connexion with a pipe from an ordinary steam boiler) is inserted, the use of the apparatus being as follows:—

When the purifier requires changing, the gas-ways are, of course, closed, and the air-ways opened; a tap is then turned, and steam passes through the nozzle into the purifier. The effect of this is to cause a rapid current of air to pass through the purifier, and permeate the purifying material, then to pass into the outlet, where it is thoroughly diluted with steam, after which it rapidly ascends and mingles with the upper air. Thus by the employment of steam in the manner described there is not only a sufficient current of air induced for a complete revivification of the oxide, but the use of it keeps the purifying material from getting unduly heated, and produces that degree of dampness most suitable for this purifying agent.

The cost of alteration for my four purifiers (as per plan) has been £24, but the price would somewhat vary, according to the distance to the ventilating shaft.

The cost of cleaning out and refilling purifiers, together with the time taken up in preparation for the same, amounts to 10s. each purifier. I have taken out the oxide from the purifier after five complete revivifications, and after more than 2 million cubic feet of gas had passed through, and found the material in good order; indeed, I am of opinion it would have answered three times as long without causing any additional back pressure.

Therefore, assuming that the plan which I now adopt had been in use for the last three years, I should have saved no less a sum than £106; this would make the average a farthing, and supposing a purifier would pass 200,000 or 250,000 cubic feet of gas before requiring cleaning, by the use of the method I propose, there would be a saving of labour to the amount of £2 per million cubic feet in one case, and £2 10s. in the other.

I therefore think you will readily see that, by adopting the process I have suggested, the trifling outlay would soon be repaid, while the general benefits to be derived are both permanent and substantial.

In conclusion, gentlemen, I would simply observe that I had much wished to have gone into other details connected with this matter, but have condensed it as much as possible in order that I may not trespass too much on your valuable time.

Mr. HODGSON JONES (London) asked the writer whether, since the use of steam, he had been less troubled with naphthaline than previously. His reason for asking the question was that at one of the Lyons stations, a process of the revivification of the oxide by means of steam was employed, and the result was entirely to do away with naphthaline in the purifiers.

Mr. BARRATT asked Mr. Fish the cost to him of lime per ton.

Mr. BROADHEAD (Great Grimsby) said he used lime entirely at his works, and he found that, for the year ending Dec. 31, 1871, they used 254 tons of lime, a at cost of £124 12s., to which must be added for labour £84 16s., making together, £209 8s. Deducting (£40 0s. 6d.) the value of impure lime sold, the net cost of purifying 48,416,000 cubic feet of gas was therefore £169 7s. 6d., being 0·839d., or a little under 1d. per 1000 cubic feet.

Mr. CRAVEN (Batley) asked how long it took to revive the oxide in the purifiers by the method suggested. The figures which he had written out as to the cost of purification by lime agreed very nearly with those of Mr. Fish—viz., 1·15d., as against 1¼d. for material and labour. Since he had adopted the combined materials, iron and lime, the cost had been reduced to ¾d. per 1000 cubic feet of gas.

Mr. SYMS (Rochester) said the cost of purification at his works by means of lime only, was in 1870, about 1s. for 30,000 cubic feet of gas.

Mr. KELSALL (Ashton-under-Lyne) said the cost would of course depend largely upon the value of lime in different districts. At his works it was found that, exclusive of the sum received for spent lime, which was comparatively small (only 6d. per ton), the cost, on the average of the year for material and labour was only ·67d. He doubted whether any one, whether using lime alone or the combined process, could reduce the cost of purification below that.

Mr. BARRATT said his make of gas last year was 48,500,000 cubic feet. He purified with lime alone and the cost, including material and labour, was only £12 17s. 6d., which was below ·50d. per 1000.

Mr. G. ANDERSON said he had tried oxide of iron and lime for purification, and would like to make a remark or two on the paper just read. In the first place, oxide of iron would not purify gas as lime would. It only removed one impurity, the sulphuretted hydrogen, with a small portion of ammonia, which those who understood their own interests did not wish to have removed. On the other hand, lime removed both sulphuretted hydrogen and carbonic acid, the two greatest impurities in coal gas, and those which had made the gas managers profession the most difficult. It was very well known that oxide of iron had only been adopted for purification because of the nuisance occasioned by dry-lime purifiers. That nuisance arose from the anxiety to make good gas without knowing sufficient of the operation. If the lime was removed from dry-lime purifiers the moment it gave a black test by acetate of lead paper a great mistake was committed, because it would continue to do good in the purification of gas for a long time after it ceased to attract the whole of the sulphuretted hydrogen. By the use of lime in a proper manner, having the purifiers large, and allowing the gas to pass through in a very quiescent state, they would not only get rid of the impurities named, but also the bisulphide of carbon, which at the present moment was perplexing the gas interest of London. Formerly, there were two gas-works in operation in the town of Dover, and the purifying power being largely in excess of the actual requirements, they were enabled to carry on the process as he indicated, the result being that they had sometimes purified to the extent of 30,000 cubic feet of gas per bushel of lime. As to the relative cost of the two materials, every one knew that purification by oxide was far more expensive. Taking the same cubical contents of oxide and lime, the latter would last two or three times longer than the former. Managers ought, therefore, to pause before they abandoned the use of lime in order to adapt themselves to the mushroom notions of the day. He had an opinion that gas purified by oxide of iron did not possess so high an illuminating power as the same gas would have if purified by lime, and he believed it would be found that there was more naphthaline formed in the course of oxide purification. As to the principle of revivification suggested by Mr. Fish, he would only say that if he could succeed in doing it in the purifiers without the necessity for removal, it would be a great economy of labour, and he would accomplish that which had been before attempted, but hitherto unsuccessfully, in London.

Mr. HUNTER (Rochdale) said he agreed more with Dr. Odling than with any of the speakers on the present occasion—viz., that they ought to use lime in the first box until it became sulphide of calcium, and to use it still as sulphide of calcium until it became carbonate of lime, allowing the sulphuretted hydrogen to pass to the next box, and employing oxide of iron in the last box. By the adoption of the oxide of iron process in combination with lime at Rochdale, a saving had been effected of something like £300 or £400 per annum. They had the oxide material brought to them and taken away, and were allowed the use of it without any cost whatever. With regard to Mr. Kelsall's remark about the cost of lime being only ·50d. per 1000 cubic feet he did not think he could compare favourably with him, but there were other circumstances than locality which might influence the matter. In some cases there might be small purifiers, in others an excess of purifying surface.

Mr. PARLBY (Aylesbury) remarked that the cost of purifying by oxide must of course depend greatly upon the price put upon that commodity. Since using it he had found the price to vary considerably; some firms supplied it as low as 15s., others as high as £3 per ton, and this too not altogether because of the difference of quality. The method of purification would likewise affect the cost; some works used more lime than oxide, others more oxide than lime to purify the same quantity of gas, and where this was the case there was sure to be some disparity as to the result. In his works he used oxide and lime in the usual manner; but, taking the report of the referees and the observations of Dr. Odling, it appeared to him that there was a great deal to be done before the process of purification was perfect. The cost of purification by lime alone at his works was ¾d. per cubic feet; by the use of oxide and lime combined the cost was reduced to ½d., and he hoped still further to economize the expense.

Mr. HARDICK (Salisbury) said he had frequently visited the Bath works, where a somewhat similar process of revivification of the oxide was adopted by the manager, and from his own knowledge the oxide material in the purifiers had not been changed for six months.

Mr. WOOD (Hastings) said he had manufactured his own oxide for the last four or five years very successfully by dissolving up the old iron of the works with sulphuric acid, using the sulphate of iron in a liquid form with sawdust, which made a very active oxide. It had never cost him more than 8½d., and seldom more than 7d. per bushel.

Mr. WARNER called attention to the importance of keeping the purifying apparatus on longer; it was better for the gas itself, and was much more economical.

Mr. ELDRIDGE (Richmond) said he had recently visited Mr. Fish's works, and was much pleased with what he saw there of the practical application of his system. It was a generally recognized fact that the great drawback to the use of the oxide process was the expense of emptying and charging the purifiers by the revivifying of the spent material. When at Mr. Fish's works he saw the gas tested in a dirty purifier, and found it was very foul, and on the cover of the purifier being removed the oxide was perfectly black. Mr. Fish then applied his method of revivification, and on visiting the purifier four hours afterwards he ascertained that it was most successful, and that there had been a thorough reviving of the material. He felt that this was a matter worth the consideration of every gas manager, and that they were all under great obligations to Mr. Fish for his simple and most effective contrivance. It appeared to him that the oxide was as clean as when the purifier was first charged.

Mr. FISH said he would endeavour to reply to the questions in the order in which they had been put to him. Mr. Hodgson Jones asked whether there had been any diminution in the amount of naphthaline since the adoption of this process. He was happy to assure that gentleman and the meeting generally that in the last six years, during which he had represented the Hornsey Gas Company, he had never seen a teacupful of naphthaline in any of the vessels. As to the cost of lime—at Hornsey it was very dear, averaging 16s. 3d. per ton delivered on the works. With reference to the time taken up in revivifying the oxide, Mr. Eldridge had kindly spoken on that point, and he could also bear out his statements that those purifiers, 12 feet square, and containing 10 tons of oxide, were effectually revivified in 4 hours. The operation might have been completed in 3½ hours. In one of his purifiers gas was turned in on the 1st of Jan. last, and up to the 1st of June inst. 8,882,000 feet of gas had passed through it without the purifying material being once removed.

The PRESIDENT thought there was one matter in his paper which Mr. Fish had overlooked, and which, as it came under his (the President's) cognizance officially, he would state—viz., that the amount of sulphur compounds in the gas at Hornsey amounted to no more than 15 grains per 100 cubic feet. With reference to the process under discussion, he had seen it in operation, and had a very high opinion of its efficiency. It certainly effected a great saving of labour, and revived the oxide in much less time than it could be done by any method with which he was acquainted. In speaking of the various methods of purification adopted by London engineers, he (the President) must express his deep regret that Mr. Anderson had indulged so much in personal remarks on the present occasion, because those remarks were quite uncalled for, and their use only tended to throw discredit upon the association before which they were uttered. He would only add, that he earnestly hoped they would be avoided in the future. It was a very painful matter to be compelled to speak thus, but his position as president forbade that he should allow the remarks referred to to pass unchallenged.

Mr. R. H. JONES (Dover) read the following paper:—

ON THE INCREASED PRICE OF COAL AS AFFECTING GAS COMPANIES.

In introducing this subject to the members of the British Association of Gas Managers for their consideration, it is not necessary to write much, because the increased cost of coals, and the difficulty of procuring them at the present time, is a subject so materially affecting the financial position of all gas enterprise, that it must force itself on the attention of the shareholders at their meetings, when the Midsummer balance-sheets are presented to them, and it is therefore a matter which cannot fail to interest the members of this association, whose experience and opinions will, I am sure, be freely given, and may, I hope, point out some course of action to comfort and guide our directors in the present crisis.

That gas coals have materially advanced in price, and that they are most difficult to procure, must be a truism to all present at this meeting. While I write this (May 24) I have vessels which have been waiting in the Tyne upwards of five weeks, and are not yet loaded.

A few weeks ago a conference of the representatives of the gas companies south of London was held, when it was generally understood that the then increased cost of coals was equivalent to an increased cost of gas of sixpence per 1000 cubic feet. This calculation was based on the assumption that coal had increased in price 4s. to 4s. 6d. per ton, and that from every ton of coal carbonized 8000 feet of gas were sold. At the present moment the rise in the cost of coals is nearer 8s. per ton than 4s., and the question for consideration is how, with the raw material (coal) so much advanced in cost, is it possible to continue to supply the manufactured article (gas) without a corresponding advance in selling price. This question was somewhat cursorily discussed at the meeting I have referred to, and opinions were ventured that the April price of coal would not be maintained—that it was only a temporary rise in the market, which would soon right itself. I ask you, is that your opinion?

I expected to have seen that the shareholders of the London companies would have more seriously alluded to the price of coal at their meetings this spring; but the shoe had not then pinched, and former contracts at old prices were still unfulfilled.

In considering how far gas companies will be affected by the increased price of coal, the value of residual products must not be lost sight of. Has coke risen in price or is it likely to rise? In some places where the consumption of gas is small, it has risen to an extent equivalent to from a penny to threepence per 1000 cubic feet of gas.

Has tar improved in value? Yes, in the London district, in the immediate vicinity of tar distilleries, prices have improved to the extent of about a penny per 1000 cubic feet of gas; but do gas companies generally participate in this rise in the value of tar?

Has ammoniacal liquor risen in value? Yes, because sulphate of ammonia is worth now more than it was in the spring of 1871, to the extent of about eightpence per ton of coals, or a penny per 1000 cubic feet of gas.

The large gas companies who have a market close at hand for their tar and liquor, will have the increase in the cost of their coals relieved to the extent of some eighteen pence per ton in the enhanced value of tar and sulphate of ammonia, a relief which will not much affect country works, especially those which are not in the immediate neighbourhood of a market for the sale of their tar and liquor.

It occurs to me, that those companies that have no reserve-fund, and are selling below their maximum parliamentary price, should not hesitate to charge their consumers an increase proportionate to the rise in the *net* cost of coal.

It would be well for those companies who are prohibited by Act of Parliament from raising the price of gas, to unite in an application to Parliament for relief, and this, I would venture to suggest, might be done by parliamentary authority being given to the Board of Trade to sanction, after due inquiry and investigation, an increased price proportionate to, and when and so often and so long as the cost of coal is in excess of an average price.

There is another class of gas-works to whom, I fear, no relief can be given. I refer to those small concerns where the consumption of gas is so limited that the price heretofore charged has come into pretty close competition with other modes of artificial lighting; to increase the price of gas in those districts would be almost suicidal, as the consumers would soon resort to the cheapest light, and all the time the coal market remains in its present condition. I fear the proprietors of those works must content themselves with a dividend "looming in the future."

Mr. FRASER (Inverkeithing) said, as a large coal owner, he might perhaps be allowed to make a few remarks upon the state of the coal trade in Scotland. In the months of March and April last year the coal owners in that country had very large stocks in hand. He himself had a stock of about 40,000 tons. At the present moment he believed no colliery owner had a fortnight's stock on hand. Last year the price was 5s. 10d. per ton, now it it was 11s. 6d. f.o.b., with a suspicion of a further rise. Two years ago Lochgelly cannel was worth only 9s. 6d., this year it was worth 17s. 6d., and they could not supply the demand. All the cannel coals in Fifeshire were in the same position. Some people might think that the coal masters were pocketing the difference in price as profit, but he would mention as a fact that he now paid for wages and expenses of working coals more money than last year he obtained for the coal itself, leaving out all account of royalties and the expenses for wood and other materials, which came to about 1s. per ton more. He suspected that gentlemen connected with gas-works would have to fall back upon some other material—the oil from shales for instance. The bituminous shales in Scotland were now selling very cheap, and he thought the able engineers of gas companies might, when necessity required, turn attention to these as a means of increasing the illuminating power of their gas.

Mr. G. LIVESEY thought there should be a combined action on the part of gas companies to raise the price of coke, which was a matter not limited by Act of Parliament.

Mr. BROADHEAD said his company had been compelled to raise the price of gas in consequence of the increased cost of coal, and he agreed with Mr. Livesey that the price of coke would have to be increased.

Mr. WOOD (Hastings) said he had lately been instrumental in calling together the managers of gas-works in the south-eastern district of England, to consult on this subject, and it was admitted that it was impossible to avoid a rise in the price of gas before long. In many of the places represented,

the increase had already taken place. The increased cost of coal affected gas companies in a variety of ways. Some companies had a good reserve-fund to fall back upon, and they would wisely wait to see how things would go on. Other companies who had been sailing close to the wind, now found that they were obliged to run before it. Some had greater facilities than others for getting in coals; with others the value of residual products was greater. At Hastings there was great difficulty in obtaining coals, there being no landing-place for the purpose; freights were also very high, and last winter, when the company first felt the effect of the increased cost of coal, the price of coke was lower than usual, and they had a larger stock on hand than ordinary. This was to be accounted for by the fact that the consumption of coke depended upon a different condition of things to that of gas. The consumption of gas depended upon the weather; in dark, heavy weather, it was necessarily increased. The consumption of coke depended upon the temperature—whether warm or cold. Last winter the weather was dark and heavy, but it was not very cold; the consequence was, that as in Hastings, coke was mostly sold for domestic purposes, its sale went off very badly. He thought the general rise in the cost of coal throughout England must end in a rise in the price of coke. He knew two or three instances where companies had been just on the point of reducing the price of gas, but were compelled in the existing state of things to retain present rates. He could see no reason why gas companies should not raise the price of their manufactured article, when the price of the raw material was so largely increased.

Mr. GREENFIELD (Torquay) said his company had been obliged to give notice of an increase in the price of gas. The west of England suffered most severely last winter from the serious advance in the cost of coal. There was also great difficulty in getting it; and the value of the residual products did not advance correspondingly. In many towns coke had gone up considerably, but this was not the case in the west of England. There was one thing he was desirous to point out to the members of the association. It depended very much upon themselves as to the price of these products, and they ought not to commit the suicidal policy of underselling each other. If gas engineers would come to some general understanding, gas property would be in a better position.

Mr. CRAVEN (Batley) said the increased cost of coal would make a difference of £4000 a year to his company.

Mr. METHVEN (Bury St. Edmund's) read the following paper:—

AN IMPROVED PRESSURE REGULATOR.

In gas-works in which the pressure is attended to by the foreman stoker, it frequently happens, from the hurried way in which the ordinary weights are removed from the governor or placed on it, that the sudden alteration of the pressure attracts the consumer's attention, and gives rise to an exaggerated complaint. Even although the manager may know that there was nothing worthy of much remark on the night in question, it is not always pleasant to hear the inquiry "What was the matter with the gas last night; mine nearly went out?" To remove the cause of such complaints, I have designed this simple apparatus, which, for want of a better name, I have called a Pressure Regulator. I am aware that water has been often used for this purpose, with an arrangement of cocks to draw off the water to the proper level; but I have not seen such a simple and easily adjusted arrangement as this, which I have the pleasure to introduce to the members of the Association.

The apparatus consists of a jar A, with an internal cylinder B, through which the guide-rod or chain of the ordinary governor passes, and of a piece of flexible tube, one end of which is attached to an elbow passing through the side of the jar at C, and the other end to a tube T, which is elevated or depressed by the guide-rod D. The guid -rod D has a number of holes in it, by means of which it is kept in the position required at any hour of the night.

The action is as follows:—The rod D is lifted up so that the point of the tube T is at the height required to give the maximum pressure for the night. The jar is then filled with water. When the pressure is to be reduced the attendant drops the rod D a hole, the water runs off to that level, and the pressure is reduced accordingly, and so on at each successive hour until the tube rests on the bottom of the jar and the water has all run out, and the minimum pressure is attained; the effluent water passes into the governor-tank, out of which, by an overflow-pipe, it escapes into the drain outside the building in which the governor is placed.

In order to maintain regularity in altering the pressure, a small time-piece may be attached to the jar, which by means of a cam on a spindle revolving once in twenty-four hours, will elevate and depress the tube T.

Mr. MILES (Deane) said at the gas-works with which he was connected there had been a somewhat similar apparatus in use for the last twelve years; the only difference was that the cistern was of the same diameter as the bell—the method of getting rid of the water was the same. It was done by means of one pipe attached to the outside of the cistern, which could be lowered to a certain degree, and no more attention was needed. It had worked well, but it was after all so simple a matter that he had not thought it worth mentioning.

Mr. METHVEN quite agreed with Mr. Miles that it was hardly worth mentioning, but its very simplicity had excited the admiration of a friend, and as it had saved him some trouble he thought he might as well give the members generally the advantage of it. Ever since it was introduced he had had no complaints, and he had been able to reduce the pressure to the minimum required.

The reading of papers and discussion was then brought to a close.

ELECTION OF OFFICERS.

The SCRUTINEERS (Messrs. Eldridge and Plumbe) reported the result of their examination of the ballot-papers, and that the following gentlemen had been elected as officers, &c., for the ensuing year:—

President, Alexander Angus Croll, Esq.

Vice-Presidents, Messrs. G. T. Livesey (London), Joseph Wood (Bury), and T. N. Kirkham (London).

Treasurer, Henry Newall, Esq.

Committee (to replace the three members going off by rotation), Messrs. James Eldridge (Richmond), M. Broadhead (Great Grimsby), and J. Hutchinson (Barnsley).

Auditors, Messrs. S. P. Leather (Burnley) and A. Hersee (London).

Hon. Sec., Mr. W. H. Bennett.

PROPOSED ALTERATION OF RULE 16.

Mr. MILES (Deane), according to notice, moved "That notice of the annual meeting, with a list of the papers to be read at such meeting, be in the hands of the members twenty-one days previously." In support of the motion he urged that the alteration would afford members a longer time to consider the subjects to be discussed, and to prepare themselves to take part therein.

Mr. MILES (Clitheroe) seconded the motion.

The PRESIDENT said the committee had considered the proposed alteration, but the practical difficulties to which it would give rise prevented their recommending it. The honorary secretary had some trouble in getting a complete list of the papers to be read even within the fourteen days allowed by the present rule.

Mr. WARNER urged Mr. Miles to withdraw the motion after this intimation.

Mr. SPICE moved as an amendment—"That the present rule stand"—which, being seconded by Mr. Craven, was put and agreed to almost unanimously.

Mr. MILES submitted a motion, which, however, he at once withdrew, that a portrait of the president for the time being should appear in the printed transactions of the association.

PREMIUMS FOR PAPERS.

The PRESIDENT said in his inaugural address he had thought it advisable to suggest to the association, that premiums should be offered for papers to be submitted at the annual meetings. In similar institutions that course had been adopted, and the result was to produce a better class of papers, and as this association had now funds in hand, he thought they should offer every inducement to the members to excel in their communications. There was no question that the papers read at the annual meetings, were almost the essence of the success of the association, for without them there could be no discussion and no interchange of thought on matters of practical importance and value to the members. The course which he thought it well to adopt was that the opinion of the meeting should be taken upon the principle whether it was expedient to appropriate a sum of money for the purpose, and to leave the details to be worked out by the committee, and submitted at the next annual meeting.

Mr. W. ROMANS (London) disapproved of the proposal, on the principle that he objected to read sermons which might be the production of other people, and purchased for delivery. Gas engineers should act independently, and read their own productions.

Mr. ANDERSON entertained something of the same opinion, and expressed a fear that some members who were now in the habit of contributing might not like to do so hereafter, lest it should be supposed they wrote for the sake of the premiums, and not because of the interest they felt in their profession. At the same time, if the committee found there was a difficulty in getting a sufficient number of papers at present, and that the proposal might stimulate their production, the meeting ought to support them. He took the opportunity now offered him to express regret that the remarks he had made at an early part of the meeting should have been austerely viewed by the president. He begged to say that he was proud of his acquaintance with many of the gas engineers of the metropolis, and it must not for a moment be supposed that his observations were prompted by any ill will to those gentlemen.

Mr. GODDARD agreed to some extent with Mr. Anderson in the former part of his speech. For his own part he would be very sorry to provide a paper to be read before the association with any expectation of being paid for it. At the same time he thought that by offering a premium for papers on subjects of special interest they might induce the members to direct attention more particularly to those subjects, and thus derive, as their brethren in Scotland had done, considerable benefit from the arrangement. If a trial could be made by offering premiums of 10, 15, or 20 guineas for the best papers on some specific question, it would be an excellent appropriation of the funds.

Mr. H. P. STEPHENSON thought there was a great deal of force in the remarks of Mr. Anderson, that persons might be deterred from writing papers lest they should lay themselves open to the suspicion of writing for money. If the association were to have a special medal struck to be awarded as a mark of distinction and approval, there would not be the same objection that existed to receiving a sum of money.

The PRESIDENT said it had never occurred to him that the premium should take the form of the payment of a sum of money. Premiums of this kind were generally given in medals or books. There were precedents for the course he had suggested. The Institute of Civil Engineers and the Society of Engineers, as well as other kindred institutions, were in the habit of thus marking their approval of special services. He for one would oppose *in toto* any payment of money.

Mr. PRICE (Llandudno) inquired whether he was correctly informed that the committee had had difficulty in obtaining papers.

The PRESIDENT said it was a very proper question, and one which he must answer in the affimative. The difficulty increased year by year.

Mr. METHVEN said, when he originally made the proposition, he was aware of the difficulty experienced by the committee. He suggested that a premium might be offered for the best engine and exhauster, taking the expense of the exhauster and the arrangements into account.

Mr. H. JONES remarked that, notwithstanding the difficulty of obtaining papers, there were five on the list for the present meeting unread for want of time.

The PRESIDENT said there were only three.

Mr. PRICE then moved, and Mr. COX (Sunderland) seconded, a motion to the effect that the association award a medal to the writer of the best paper on a subject to be selected by the committee.

Mr. SPICE though the premium should not of necessity be a medal, and suggested that the motion read "a medal or other work of art."

Mr. PRICE accepted the suggestion.

Mr. PEEBLES spoke in favour of awarding prizes. In Scotland they were given in this shape: the persons to whom prizes were awarded were allowed to select articles of the value of the prizes. At the same time there might be members of the association to whom a money premium would be more acceptable.

Mr. WARNER hoped the members would adopt the suggestion of the president if they approved the principle, and refer it to a committee to report to the next annual meeting.

Mr. PATERSON believed that this would be the proper course to adopt.

The PRESIDENT put the motion in this form: "That this meeting adopts the principle of awarding premiums for papers, and that the details and arrangements for carrying out the object be left to the committee."

The motion was carried unanimously.

ESTABLISHMENT OF A BENEVOLENT FUND.

The PRESIDENT said the next question to which he had ventured to direct attention in his address was one of considerable importance—viz., the propriety of establishing a benevolent fund in connexion with the association. He had mentioned at the time that the gentleman whom they had now elected to succeed him offered £100 towards this object. He also reminded them that Mr. Barlow, when pointing out the necessity of establishing such a fund, promised something substantial towards it. No doubt there were other gentlemen warmly interested in the success of the association who would give something to form the nucleus of a fund of the kind. It would require considerable care in laying down the principles for its administration, and framing rules for regulating it. During the last few years a similar fund had been created in connexion with the Institute of Civil Engineers. There the matter had received a large amount of attention from gentlemen well qualified to deal with it, and they had framed a series of rules for its efficient management. It occurred to him, that if the expediency of having such a fund was recognized, it would be well to refer the question to the committee, and request them to examine that particular code of rules, to adopt them if they thought proper, or to make such amendments as they might think necessary. The association ought to deal with this question at once (under the circumstances he had named) or else allow it to lapse for a long time to come. He would move—"That in the opinion of this meeting it is desirable to form a benevolent fund, and that the arrangement and disposition of such fund and the regulations necessary for its management be referred to the committee, who shall submit a report thereon to the next meeting for adoption."

Mr. WARNER seconded the motion, and said he was most happy to think the subject was now assuming a tangible form.

Mr. BARRATT suggested that, having regard the financial position of the association, they might appropriate £100 to the object.

The PRESIDENT thought it was a very good suggestion, but one that had better be dealt with subsequently.

Mr. SIMPSON said at the last annual meeting a report from the committee which was unfavourable to the formation of such a fund was adopted. He thought it would be better, therefore, before coming to such a decision as was involved in the motion, that the same or another committee should again consider and report on the question, otherwise they would be overthrowing one year what they resolved upon the year previously, without any cause assigned. He would move as an amendment—"That before any further steps are taken in the matter, a committee be appointed to consider and report thereon."

The PRESIDENT said it must be remembered that when the question was discussed at the last meeting they had not before them the munificent offer which was now made. Everything depended upon a good start, and if the present opportunity was lost they could never with any grace take it up again. In answer to an inquiry, he said it would not be made compulsory upon the members to subscribe to the fund. It would be a purely benevolent fund, and not in the nature of a club.

Mr. CUTLER said, in the event of the fund being formed, he should be happy to give £50 towards it.

Mr. LIVESEY seconded the amendment, feeling that an opportunity should be given to reconsider the subject before any decision was arrived at. If the necessity existed for such a fund they ought to initiate it, whether money was offered for the purpose or not; if it was not necessary they should abandon the notion altogether, and give the gentlemen, who had kindly proffered help, the opportunity of disposing of their money in other directions. It was not quite correct to say that the committee reported unfavourably on the subject last year. All they did was to report the opinion of the members on the special point of inquiry. One of the four questions proposed was, "Do you know of any cases requiring the assistance such a fund would afford?" The answer was that no such cases were known. Under such circumstances, the committee were bound to report that it would not be advisable to recommend to the association the formation of a benevolent fund.

A MEMBER said the sad case of Mr. Richards, of Wilmslow, last year, proved the necessity for such a fund.

Mr. LIVESEY said, if a benevolent fund had been in existence, there would not have been so much money raised for Mr. Richards's family. Probably the committee of the fund might have voted £50, and persons outside might have said, we subscribe to the fund, and it is not necessary to do more.

Mr. IRONS said it was no doubt true that the members did not know of any case requiring assistance at the time the inquiry was made, but as gas managers they must often have come across instances of distress in which the help of such a fund would be most valuable. Cases frequently occurred in which relief could only be obtained through the benevolent exertions of gentlemen like Mr. Barlow in raising subscriptions. It was not right that such a matter should depend upon the personal interest of gentlemen who happened to be well known in the profession.

The amendment to refer the question to the committee for further consideration before taking any steps was then put to the meeting and lost. The motion affirming the desirableness of establishing a fund and referring it to the committee to arrange the details and report to the next meeting, was put and carried by a large majority.

PLACE AND TIME OF NEXT MEETING.

The places named were Edinburgh, Manchester, Newcastle-on-Tyne, London, Birmingham, and Leeds.

A show of hands was taken on each, and ultimately, by a large majority, it was decided that the next meeting of the association be held at Edinburgh.

On the motion of Mr. GODDARD, seconded by Mr. OHREN, it was resolved that the next meeting be held on the second Tuesday in June, 1873, and following days.

PROPOSED ALTERATION OF RULE 29.

The SECRETARY read a requisition from five members to the following effect:—"Pursuant to rule 39 we request you to bring before the association the expediency of substituting the following for rule 29—'On or before the 10th day of May in every year each member of the association shall be requested to nominate members eligible to fill the offices of president, vice-presidents, treasurer, hon. secretary, auditors, and three members of committee, in lieu of those retiring from office, such nominations shall be returned to the hon. secretary by the 20th day of May, and the list of names so nominated shall be forwarded to each member of the association before the annual general meeting. Each member to make a selection from such list, but the names so selected must not in any case exceed the number to be elected to the respective offices.'"

Mr. GODDARD said this subject had been before the committee, and had been well considered by them. The proposal appeared to be quite impracticable. The committee, as the meeting were aware, was appointed by the whole body of members, but it was found to expedite the business of the meetings that a "house list" should be prepared for the election of the various officers of the association. Attached to that list there was always a line upon which the name of any other member could be written, for whom it was desired to vote. The present system was extremely simple and effective; the alteration proposed would involve a great deal of additional labour, without any compensating advantage.

Mr. KELSALL moved as an amendment—"The existing rule be approved."

The PRESIDENT said it must be evidently undesirable to be constantly altering the rules of an association. The present rule respecting the election of officers and committee gave the members power to vote for any one they chose, and no additional power would be conferred by the proposed alteration. There were now 425 members in the association, and if circulars had to be sent to each, it would cause much increase in the work of the honorary secretary, and a great amount of confusion and obstruction in the arrangements.

The amendment was put and carried.

VOTES OF THANKS.

On the motion of Mr. WARNER, a vote of thanks was given to the scrutineers for their services.

The PRESIDENT moved—"That the best thanks of the association are due, and are hereby presented, to the Council of the Society of Arts, for their kindness in allowing the use of their rooms on the present occasion, and to Mr. Le Neve Foster, for the courtesy and consideration shown in the arrangement for the reception of members." He said the society had been extremely kind, not to this association only, but to every scientific institution, in allowing them to meet there without any expense.

The motion was duly seconded and cordially adopted.

On the motion of Mr. WOOD (Bury), thanks were voted to the gentlemen who had prepared papers and drawings to submit to the association.

On the motion of Mr. METHVEN, a cordial vote of thanks was given to the committee for their valuable services during the past year.

On the motion of Mr. SIMPSON, thanks were also tendered to Mr. Newall for his kindness in continuing to act as treasurer of the association.

Mr. GODDARD said there was another duty to be performed to which it gave him great pleasure to invite the members. He was sure they would most heartily join with him in carrying the following resolution:—"That the thanks of this meeting be presented to Jabez Church, Esq., for the very able manner in which he has conducted the business of this session, for the very admirable inaugural address which he delivered at the opening of the sittings, and also for the earnest desire he has at all times manifested to promote the prosperity of the association.

The motion was put and carried by acclamation.

The PRESIDENT: Gentlemen, if anything was wanted to complete my satisfaction in holding the office of president of this association, it has been supplied by the very cordial manner in which you have assured me of your approbation of my conduct on the present occasion. I consider it a very great honour for any member of the association to hold the office of president. I trust it will be always held in that esteem by every one, and that nothing will be at any time lacking to uphold the dignity of the position. I hope the office has not suffered in my hands. I have endeavoured, to the utmost of my ability, to serve you, and I feel myself amply repaid for any services I have rendered by the vote of thanks you have just passed.

On the motion of Mr. WARNER, it was resolved that the thanks of the association be given to Mr. W. H. Bennett for the attention bestowed by him upon the duties of his office during the past year.

Mr. BENNETT, in acknowledging the vote, said: Gentlemen, I am exceedingly obliged to you for the kind manner in which you have expressed your approval of my conduct. There is nothing which stimulates one to exertion so much as the consciousness that services rendered are cordially appreciated. I assure you that this is the effect of your vote upon me, and I can say with confidence that nothing will be wanting on my part to promote the well-being of the association.

The sitting was then brought to a close.

In the evening the members of the association dined together at the City Terminus Hotel, Cannon Street.

THURSDAY, JUNE 13.

This morning the members and friends proceeded by special steamer down the river to North Woolwich, from whence they were conveyed by train to Bromley, and after inspecting the new works of the Imperial Company, in course of construction, receiving the courtesy and partaking of the hospitality of Messrs. Clark and Kirkham, the engineers of the company, were reconveyed by train to North Woolwich. They then proceeded to Beckton, and visited the works of The Gaslight and Coke Company, which are now in full operation. After spending some two hours in viewing the various matters of interest in connexion with these most extensive works, the members returned to London by boat, thus bringing to a close the proceedings of the session.

TRANSFER OF THE KILMARNOCK GAS-WORKS.—On the 14th ult., the gas-works were, according to agreement, formally transferred to the hands of the corporation, and the new officials have entered upon their duties.

SALE OF THE HECKMONDWIKE GAS-WORKS TO THE LOCAL BOARD OF HEALTH.—At a meeting on Thursday, June 20, of the shareholders of the Heckmondwike Gas Company, Mr. Geo. Burnley, the chairman, presiding, resolutions were passed unanimously agreeing to dispose of the works to the Board of Health, provided acceptable terms could be agreed on, and authorizing the directors to enter into treaty with the board for the sale and purchase of such works.

RISE IN THE PRICE OF GAS AT BRADFORD.—The *Leeds Mercury* says: "We hear that the Bradford Corporation is about to raise the price of gas supplied to consumers. The price has latterly been 3s. per 1000 feet; but in consequence of the rise in wages, the enhanced cost of coal, and of production generally, it is intended to advance the charge to 3s. 4d. per 1000 feet. This proceeding will, no doubt, cause some grumbling, but it seems to be a necessity arising from the above-named causes."

FIRST FRUITS OF THE RYDE GAS AGITATION.—The mayor of the borough has been served with a writ for £557, at the suit of Mr. G. W. Stevenson, gas engineer, for professional charges in connexion with the late inquiry respecting the proposed purchase of the gas-works. This is in addition to £100 previously received on account. This is a pretty prospect, seeing that it is simply a commencement of the trouble entailed upon the town in consequence of this most unfortunate step. Since the issue of the writ the directors of the gas company have served a notice, requiring the corporation to pay the amount of the award, and take the works. The inhabitants are indignant, and the Local Government Board in London will not sanction increased borrowing powers.—*Hampshire Advertiser.*

HEBDEN BRIDGE GAS COMPANY.—The annual ordinary general meeting of this company was held on the 17th ult., when the twentieth annual report was passed. It provided that a dividend be paid of 10 per cent. on the A stock, and 7 per cent. on the B shares, free from income-tax. Three directors retire, but two of them were re-elected—viz., Messrs. E. Gaukroger and W. Jackson, and Mr. A. Cockroft for the other; it was also agreed that the directors have £23 allowed for their services. The cash in bank belonging to the company is £821 12s. The Act of Parliament balance has been paid off during the year, which amounted to £368. The capital of the company is 81,500 shares of £1, 250 shares at £10 temporary loans £1085 10s. 10d.

SUPPLY OF WATER TO HAMILTON, N.B.—The annual financial statement of the treasurer to the Hamilton Water-Works has just been issued. The assessment during the year realized £1423: domestic water rate, £504; public, £629; otherwise, £290—total, £1423. The debt due by the commissioners, amounting to £11,945, was reduced during the year to the extent of £145, and £308 was expended on the extension and formation of new works.

SUPPLY OF WATER TO DUNDEE.—At the meeting of the Water Commissioners on the 13th ult. the accounts for the past year were submitted by the Convener of Finance. The revenue amounted to £22,933 12s. 4d., and the expenditure to £22,191 1s. 11d., showing a surplus of £742 10s. 5d. This result had happened notwithstanding the reduction of the rates from 1s. 6d. to 1s. 3d. in the pound, the paying of £2000 for the Elliot supply, and other incidental charges. This year the sum of £2000 would have to be paid for interest for money borrowed to carry on the new works, but it was not proposed to raise the assessment. The hope was expressed that the whole new works would be executed without having to add a single penny to the rates.

AYR WATER COMPANY.—The annual general meeting of the shareholders of this company was held on the 19th of June—Mr. James Paton, vice-chairman, presiding. The directors report stated that the income for the past year had been £2789 12s. 5½d., and the expenditure £811 18s. 3½d., leaving a balance of £1977 14s. 2½d. The report recommended a dividend of 5 per cent., and that the remainder of the balance, amounting to about £200, be added to the depreciation-fund. It also recommended that the rates be reduced 1d. per £1, that meter-rates be reduced 6 per cent., and that the charge for baths be reduced from 8s. to 4s. each. The chairman, in moving the adoption of the report, said it was very gratifying that the affairs of the company were in so satisfactory a state as to warrant them to make a reduction on the rates. The report was unanimously adopted. The engineer's report stated that the works were in good order, and that there was an abundant supply of water, the reservoirs being quite full.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN JUNE, 1872.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	17·90	0·097	0·147	0·003	14·5	3·9
West Middlesex	19·00	0·070	0·131	0·001	15·5	4·6
Southwark and Vauxhall	19·13	0·102	0·131	0·003	15·6	4·0
Chelsea	18·07	0·093	0·166	0·002	14·6	4·0
Lambeth	18·87	0·090	0·111	0·003	14·8	3·9
Other Companies.						
Kent	27·43	0·009	0·220	0·000	20·6	6·0
New River	17·93	0·042	0·131	0·000	14·9	3·8
East London	19·73	0·048	0·168	0·001	16·0	4·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was more or less turbid—namely, in that of the Lambeth, the Chelsea, and the Southwark and Vauxhall Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 107,859,997 gallons; and the number of houses supplied was 495,649. This is at the rate of 33 gallons per head of the population daily.

H. LETHEBY, M.B.

NEW SEWERAGE SCHEME FOR CHESTER. — Application having been made to Government by the Chester Town Council, for powers to borrow the sum of £22,000 for the construction of a series of intercepting sewers, an inquiry was held on the 18th ult., at the town-hall, by Mr. J. Thornhill Harrison, one of the inspectors of the Local Government Board, for the purpose of hearing evidence thereon. There was substantially no opposition, as the points which had been previously raised in committee and in the council were noticed by the inspector. The first was that the fall of 1 in 1760 of the sewer from Boughton Fords to Dee Lane bar was not sufficient, and this Mr. G. A. Bell, the engineer of the council, proposed to remedy by the construction of a reservoir, in which the water from the Dee would be collected for the purpose of flushing the sewer. The inspector suggested that, if possible, pumping at the chief outfall should be avoided, and that the tanks for receiving the sewage should be excavated, so that the effluent water could escape, leaving only he solid matter to be dealt with; but Mr. Roberts, engineer, said that one obstacle to that would be the nature of the ground which below the surface was quicksand. After the inquiry, the inspector saw the line the sewer would take, and said, on viewing the land were the outfall would be, that there was nothing in what the council proposed to do there to prevent his giving his approval of the plans.

ACCIDENT AT THE RADCLIFFE GAS-WORKS.—The *Manchester Examiner* reports that on Monday afternoon, June 24, about four o'clock, an explosion of gas occurred in the governor-house at the Radcliffe Gas-Works, and as the undertaking has been in operation about 25 years without anything of the kind having previously taken place, the calamity has caused considerable excitement in the neighbourhood. On the east of the main entrance, and immediately behind the retorts, is erected a small shed termed the governor-house, in which is placed apparatus for regulating the pressure upon the gas. This apparatus consists of two small meter-shaped tanks. At intervals it becomes necessary to change the ammonia water with which these are partially filled. In order to do this, at the hour stated, four men, named respectively Thomas Simpson, labourer, of Booth's Houses, Radcliffe; John Brandwood, book-keeper and cashier, Spring Well Terrace, Radcliffe, brother to the manager of the works; William Tinsley, meter inspector, and George Williamson, labourer, Foundry Street, Radcliffe, were engaged in supplying the governors with fresh water. Tinsley, who had the direction of the works, left the house for a few moments, telling Simpson to keep the water well supplied. This he would appear not to have done as effectually as was consistent with safety. Consequently the gas escaped from underneath one of the governors, and coming in contact with a jet which was burning near, caused an explosion. The front of the governor-house was blown out, the roof fall in, and the men were more or less injured. Simpson is much burnt about he arms, and is also cut severely on the head by the falling *débris;* Brandwood is much burnt on the hands and arms, his hat and coat being completely charred; Tinsley's whiskers are burnt off and his face is scorched; and Williamson is seriously injured in a similar manner. All the men were able to walk to their homes, and on their arrival medical aid was immediately summoned. A correspondent of the same paper writes: "The whole of the circumstances connected with the accident which occurred in the governor-house of the Radcliffe Gas-Works, at 4 p.m. on Monday, goes to show that the mishap was not the result of a direct explosion by contact between the gas from one of the governors and a lighted jet, but was caused by the electric fluid. The storm which prevailed in various parts from four to five o'clock on Monday afternoon was felt severely in the districts of Bury and Radcliffe, the lightning being very vivid. The man who was left by Tinsley, the meter inspector, in charge of the work of supplying the governor with fresh water in place of the dirty water that was being syphoned from the 'luting,' was George Williamson, and not Thomas Simpson, as previously reported, the latter being engaged scraping the governor, preparatory to painting it. What negligence there was, if any, consisted in Williamson choosing to keep within doors just when the storm was at its height, instead of fetching water to replace that being syphoned, and thus prevent the 'blowing' of the gas through the luting. Williamson's attention was called to the 'blowing' of the gas by Simpson, the atmosphere becoming heavily charged with it. At that moment Mr. J. Brandwood, the book-keeper, and the manager's brother, came in and drew the syphon away to prevent the further outflow of water, and then Williamson went out for more fresh water, but in his absence the accident occurred. Mr. Brandwood and Simpson were the only parties in the governor-house at the time, and they were both buried beneath the *débris* of the tumbled roof and front wall, but the former extricated himself, and the latter was pulled out by some workmen. There were no real evidences of an explosion. The governor from which the gas escaped was in no way injured, except in the upper part of the framework, which was broken by the *débris*, and the windows were broken simply by the falling of the wall. The damage to property will be covered by £15 or £20, at the outside. Only two of the *employés* (Mr. Brandwood and Simpson) were injured in a manner worth mentioning. They were knocked down by the shock, cut, and badly burnt, but they appear to be progressing favourably. It is stated that gas has been known to 'blow' from the governors at other times when lightning has not prevailed, and no ignition follow, thus bearing out the opinion of competent persons that the accident resulted from the electric fluid."

Register of New Patents.

1919.—ROBERT WARNER, of Jewin Crescent, in the City of London, brass-founder, and JOHN BROOKE, of the same place, foreman engineer, for "*Improvements in pumps.*" Patent dated July 21, 1871.

This invention has for its object improvements in pumps, and in order to attach the leaden suction-pipe of a pump without a soldered joint, a socket is employed, which is bolted down to a suitable foundation. The socket is shaped so as to receive the foot of the pump-barrel, and it also has a conical hole or passage at the bottom to receive the suction-pipe. The leaden suction-pipe is similarly coned at the end, and it is passed through the hole or passage in the socket until the cone on the pipe bears against the sides of the internal cone of the socket. Within the pipe again another cone is placed, having a flat flange around its upper edge. The foot of the pump cylinder bears on this flange, a packing being interposed to render the joint air-tight. This flange also forms the seating of the suction-valve, and the leather of the valve forms the packing. The bolts which bind the foot of the pump cylinder down into the socket cause the coned end of the suction-pipe to become nipped, and the pipe moulds itself to the holding surfaces so as to form a perfectly air-tight joint. As a further security an elastic washer may be inserted under the flange of the inner cone to bear against the upper end of the leaden pipe and the interior of the socket.

1937.—FREDERICK PHILIP PRESTON, JOHN THEODORE PRESTIGE, EDWIN JAMES PRESTON, and WILLIAM ALFRED PRESTIGE, trading under the firm of Josiah Stone and Co., of High Street, Deptford, in the co. of Kent, engineers, for "*Improvements in waste-water preventer cisterns.*" Patent dated July 22, 1871.

This invention relates to cisterns fitted with taps of special construction. The inflow and outflow taps are of the valve class, and one of them is fitted with a socket to give a certain freedom of action, so that the outflow can be opened to empty the cistern without influencing the inflow one. By this means the cistern is filled and emptied alternately in a perfect manner.

1940.—ISAAC BROWN, of Elur Croft Grange, Edinburgh, in the co. of Mid Lothian, N.B., for "*Improvements in the irrigation of land, the watering of streets and roadways, and in the apparatus to be used for such purposes.*" Patent dated July 22, 1871.

This invention consists in protecting perforated pipes of soft metal used for irrigation, &c., by means of shields applied over the perforated portion of such pipes, such shields being provided with slots for the passage of the jets. The pipes are sunk in the earth, which protects the unperforated parts of them. The pipes are buried under furrows turned over by a plough, which at the same time cuts a groove for the reception of the pipe. For watering roads, a continuous perforated shield of strong material is made to cover the whole length of the perforated pipe.

1942.—JOHN LEWTAS, of Manchester, in the co. of Lancaster, for "*Certain improvements in the construction of lamps employed for illuminating purposes.*" (Complete specification.) Patent dated July 24, 1871.

The feature of novelty in this invention consists in the adaptation and application to lamps of a globe or funnel, the base of which is closed in, with the exception of a slot or opening which is supported at a little distance above the orifice or opening where the flame is emitted.

1955.—JAMES DARSIE MORRISON, of 27, Grange Road, Edinburgh, in the co. of Mid Lothian, N.B., surgeon dentist, for "*Improvements in purifying water or other solvents so as to qualify them to purify other bodies by simultaneous and continuous filtering, and simultaneous and continuous distilling apparatus.*" Provisional protection only obtained. Dated July 25, 1871.

A filter is arranged in the main supply-pipe, and a die impression valve is used instead of the ordinary ball-cock for the cistern, such valve being also fitted at the ends of all pipes branching from the cistern. By this mechanically pure water is secured. Boiler and cistern stills and condensers are also used to procure water chemically pure for various scientific and other purposes.

2025.—DAVID HANCOCK and CHARLES PEARSE, both of High Wycombe, in the co. of Bucks, for "*Improvements in the production of lighting gas, and in apparatus therefor.*" Patent dated Aug. 1, 1871.

These improvements consist in forcing air through a series of vessels containing hydrocarbons, oils, or spirits, from which gas is or may be generated, whereby the air becomes impregnated with gas, and the air and gas so mixed being conveyed through a purifier, the two are utilized as a lighting gas.

2033.—EDME AUGUSTIN CAMEROY, of 123, Boulevard de Strasbourg, Paris, for "*Improvements in apparatus for regulating the pressure in delivery-pipes of water, gas, steam, and other fluids.*" Patent dated August 2, 1871.

In the distribution of water, and especially in the supply of towns, it is important to diminish as much as possible the pressure in the delivery-pipes in order to prevent waste, damage, and excess of delivery; and for gas, steam, or other fluid it is also important to limit the pressure in the delivery-pipe simply to the wants required, and this invention consists in improved regulating cocks.

In one arrangement, at the side of the passage of the cock there is a cylinder containing a piston, which is lowered by self-acting means and closes the passage more or less according to the pressure, or closes it entirely when the delivery-pipe is closed. When in the supply of water the supply-pipe is fixed to one end and it is required to limit the pressure in the delivery-pipe to two atmospheres, although the pressure of the supply is considerably higher, the following operations take when the delivery-tap is opened. The water in its passage through the cock raises the piston, and at the same time a small quantity of water runs through a narrow passage to the upper part of the piston, then through an orifice to a leather disc, having above it a regulating spring, and thence into the delivery end of the cock. During the time the pressure of the water at the delivery end of the cock is not more than two atmospheres, no change takes place, but if there happens to be less water drawn off or the delivery altogether stopped, then the pressure of the water increases and causes the disc to rise, and with a small valve to close the orifice, and then as the water which passes through the narrow passage cannot escape it acts upon the top of the piston, causing it to descend to lessen or close the passage in the regulating cock. If the delivery tap is again full open, the disc is reduced and the piston rises by the action of the water, and the passage in the cock opened to allow the water to pass through as before. This description of regulating cock can be applied to gas, steam, or other fluid.

In another arrangement a regulating water cock is made with a taper plug mounted with a two armed lever, having at one end a hollow sphere, and at the other end a counterweight, and the orifice of the plug communicates with the interior of the sphere by means of a passage in the plug and lever. As soon as the water on the letting off side acquires a certain pressure, water compresses the air in the sphere and takes its place so as to cause the sphere to balance the counterweight, but the moment the weight of the sphere exceeds that of the counterweight, the two-armed lever turns the plug of the cock to close the orifice more or less, to regulate the flow of the water or shut it off entirely, but without breaking the communication between the sphere and the orifice in the plug. When the letting off pressure is lessened the counterweight reacts to turn the plug, and enlarge or entirely open the communications.

2047.—JAMES HOSKEN, of 58, Fenchurch Street, in the City of London, engineer, and FRANCIS GEORGE FLEURY, of 24, Merrick Square, Southwark, in the co. of Surrey, engineer, for "*Improvements in water-waste preventers, or*

automatic apparatus for regulating the flow of liquids from constant supply-pipes or vessels." Provisional protection only obtained. Dated Aug. 3, 1871.
This invention relates to water-waste preventers of that class in which the passage or way through the apparatus is closed by a valve falling by its own gravity and closing against a seat situated beneath it; and consists in the employment of a stationary tube or guide-chamber containing a piston capable of vertical movement within it, and arranged to operate in combination with the valve so that the latter may be raised for opening the passage or way through the apparatus by raising the piston within the stationary tube or guide-chamber.

2062.—ALEXANDER ANGUS CROLL, of Coleman Street, in the City of London, for "*Improvements in meters for measuring water or other fluids.*" Patent dated Aug. 4, 1871.
In these improvements a cylinder is employed with a piston working therein, the rod of which operates in its rising and falling motion to cause another axis to make a partial rotation, in order that an arm or part from such other axis may act upon a sliding rod or other suitable connexion to give motion to it. This sliding rod or other suitable connexion actuates a lever, which by a stud or projection acts on another lever carrying a quicksilver chamber or other weight, to cause the other lever to move just past the perpendicular, when by the action of the quicksilver in the chamber or other weight a sudden and positive movement is obtained for changing the position of the valve so as to change the direction of the flow of the fluid to be measured. The controlment of this partial rotation of the other axis by the piston rod is effected by a stud from the piston rod acting in a worm groove in the other axis, such axis being hollow, or by other suitable means.

2063.—GEORGE GOLDSMITH and JAMES DILKES, both of Leicester, in the co. of Leicester, for "*Improvements in apparatus for heating by gas.*" Patent dated Aug. 4, 1871.
This invention, which it is proposed to call the "climax gas heater," is suitable for heating a variety of articles or substances, but more especially the heating of sad and other irons and the melting of metal, and consists in placing within a chamber, by preference constructed of metal, a burner suitable for the combustion of a mixture of gas and atmospheric air. The gas is admitted by a pipe furnished with a valve, which when the apparatus is not in active operation allows but a very small quantity of gas to pass to the burner; but the moment an iron or a melting-pot is placed in position to be heated, the weight thereof depresses a lever, which acts upon the valve so as to open it and admit such an amount of gas to flow to the burner as will produce the requisite heat. In connexion with the valve there is a screw and nut to adjust the quantity of gas that shall pass to the burner, and these are covered by a cap to prevent unnecessary interference.

2076.—ANDREW BARCLAY, of Kilmarnock, in the co. of Ayr, North Britain, for "*Improvements in coking coal and generating gas for heating and other purposes, and in the apparatus employed therefor.*" Patent dated Aug. 5, 1871.
This invention has for its object to effect economy in the coking or carbonizing of coal, and consists in employing the gases driven off from the coal in the process of coking or carbonizing it for the purpose of heating and maintaining the coking or carbonizing operations, the gas being either readmitted to the coking ovens or chambers through suitable channels, pipes, or passages in admixture with the quantity of atmospheric air necessary to ensure their combustion, so far as that can be practically attained, or caused to burn in flues or chambers surrounding the coking ovens, with suitable ports or passages for admitting the flame into the coking chamber, in order to prevent the coal being coked or carbonized being consumed by contact with atmospheric air, care also being taken to reduce to a minimum the admission of air to the coking ovens or chambers by both openings. The coking may be completed by gas produced from any source whatever, or by a quantity of coal placed in the under or any part of the surrounding chambers, with the proper quantity of atmospheric air introduced for that purpose. The gases may be drawn off and collected into a chamber or other receptacle, and forced back into the ovens or chambers by a jet or jets of air or steam, or by any exhausting and forcing mechanism, such for example as an air pump or fan. The gas obtained in this manner may be conducted through pipes, and used for heating puddling, scrap, and other kinds of heating and reverberatory furnaces, or it may be used for the generation of steam and for lighting purposes, the pipes or passages in each such case being provided with valves or cocks for regulating the supply.

2081.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in utilizing gases from blast-furnaces, and in the apparatus or means employed therein.*" A communication. Patent dated Aug. 7, 1871.
This invention relates to the treatment of the gases evolved from blast-furnaces, and to the application of the same to the heating of reverberatory furnaces, and to other heating purposes, also to apparatus employed therein, and consists essentially in causing the said gases to pass through a regenerator, such, for example, as Siemen's regenerator, and in washing and purifying the said gases by causing them before entering the regenerator to pass through an apparatus specially constructed for the purpose, which at the same time ensures the said gas or gases being supplied to the furnaces where they are to be burned at a uniform or nearly uniform pressure.

2109.—JAMES BECKETT and JOHN JAMES CAM, both of Worcester, in the co. of Worcester, engineers, for "*Improvements in treating sewage.*" Provisional protection only obtained. Dated Aug. 10, 1871.
This invention consists of a system of filtration by ascension and descension settling in reservoirs, and then evaporating in close boilers, and condensing the vapours in a brook or river. The boilers being connected with lime kilns, are heated therewith, the lime being used for deodorizing, and the waste heat arising from the process of calcination of the lime may be further used for drying the residue from the boilers.

2112.—THOMAS CHARLES PEARSON, of Openshaw, near Manchester, in the co. of Lancaster, for "*Improvements in self-cleansing high-pressure filters.*" Provisional protection only obtained. Dated Aug. 10, 1871.
The features of novelty in this invention consist in the use and application of a filtering vessel, having screws at each end of the same size and pitch, on to which the same spout or bib may be screwed, and in order that such filtering vessel may be screwed to any ordinary cock or water supply pipe, and be reversed in position for cleansing purposes; each extremity of such filtering vessel being further provided with an annular grid or sieve surrounding a deflecting plate, against which the water entering the filter is caused to play, and thus to deposit the major portion of its impurities into a cavity provided for its reception. This filtering vessel being suitable for use with Norton's patent double valve tap whereby filtered or unfiltered water may be drawn off direct from the same supply-pipe.

2135.—THOMAS ROBERTS, of the city of Manchester, in the co. of Lancaster for "*Improvements in and apparatus for filtering liquids.*" Patent dated Aug. 14, 1871.
This invention consists partly in improvements upon an invention for which a patent has already been granted to William Henry Clemesha and the present inventor, for "improvements in self-cleansing high-pressure filters," and partly in improvements in the method of and apparatus for treating liquids containing lime and other impurities in order to separate and remove such impurities for manufacturing purposes; such improvements embracing a novel form of plug cock and slide valve (working in a chest) to which a self-acting cleansing motion is applied, so that the contents of the filtering vessel shall be cleansed periodically, either after a certain number of revolutions of the actuating mechanism have been performed, after a certain period of time denoted by clock-work has elapsed, after a certain quantity of water has been measured in passing through the filtering vessel by a water-meter motion, or by a combination of such apparatus.

2140.—JAMES IRVINE LUPTON, of Richmond, in the co. of Surrey, for "*Improvements in the mode of deodorizing and utilising sewage.*" Patent dated Aug. 15, 1871.
This invention consists in adding to and intimately blending with the sewage of towns a certain amount of carbon mixed in some cases with a small proportion of phosphate of lime, the fluid part (the noxious portions of the sewage being held in a state of suspension in the carbon) being filtered off, also using the residuum as a fertilizer.

2156.—JOHN WILLIAM BEASLEY, of High Street, Leyton, in the co. of Essex, plumber, for "*An improved ball-valve or tap for regulating the supply of liquids, water, steam, gas, or other fluids.*" Provisional protection only obtained. Dated Aug. 16, 1871.
This improved ball valve, or tap, consists of a metal vessel or box, the end of the supply pipe being attached to its upper part; in the bottom of the box is a port or hole, furnished with a discharge nozzle, and over the port and inside the box is a slide moved by the rod of the ball suitably arranged for that purpose.

2157.—THOMAS JAMES SMITH, of the firm of Robertson, Brooman, and Co., of 106, Fleet Street, in the City of London, patent agents, for "*Improvements in apparatus for lighting and extinguishing gas.*" A communication. Provisional protection only obtained. Dated Aug. 16, 1871.
The apparatus consists of a box in which a diaphragm is fitted to divide it into two compartments, one being for the gas to flow through, and the other for a current of air from a blower to raise a valve below the nipple off its seat. The diaphragm is connected to a crank arm of an electrical contact maker, composed of a tooth plate and a ratchet wheel by which electrical sparks are produced. A paul is arranged to engage in the teeth of the wheel, and this paul can be lowered to break contact, on an armature being removed. In operating upon a series of lamps, valves can be arranged in the main air pipe to open and close in opposite directions to ensure each lamp being operated upon in succession. The valve for the pressure opens after the box referred to is filled, the other valve opens in a similar manner when the box is exhausted.

2180.—EDWIN JOHN GRABHAM, of 107, Shepherdess Walk, City Road, in the co. of Middlesex, mechanical engineer, for "*Improvements in the apparatus used for regulating the supply of gas.*" Patent dated Aug. 19, 1871.
By these improvements it is proposed to make use of a screw and nut or micrometer screw and barrel to be used in connexion with the main cock or supply, thereby making the turning on and off action slow and steady, so that the exact quantity that is required to be used and no more may be admitted to the pipes.

2189.—WILLIAM HENRY MOORE, of 11, High Street, Denmark Hill, in the co. of Surrey, for "*Improvements in filters.*" Patent dated Aug. 19, 1871.
According to this invention an air vessel is combined with a filter in such manner that the air becomes compressed, and from time to time when the pressure of the supply is relieved it drives back filtered water through the filtering medium and so cleanses it.

2194.—JOHN ROBERT BREACH, of 4, Bridgewater Square, Barbican, in the City of London, agent, for "*Improved gas-fires.*" Patent dated Aug. 21, 1871.
The inventor has discovered that by making an apparatus of two pieces of fire-clay or fire-brick, one piece solid, and the other piece so as to cover the under-piece, but leaving a space of about half an inch between the two, through which the fire from several gas-jets, or the flame from paraffin oil, or other similar agent is directed, that a fire-bright red is produced, but without any unpleasant smell, such as is usually given off from ordinary gas-stoves. The apparatus is made to fit the ordinary fire-places, so that the many advantages of such a fire are secured without any apparent difference in the room from the ordinary coal fire.

APPLICATIONS FOR LETTERS PATENT.

1783.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in rotary pumps and engines, and in means for effecting the transmission of power thereby, parts of which improvements are applicable to the construction of rotary blowers and ventilators.*" A communication. June 13, 1872.

1791.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the separation and utilization of volatile and condensible gases, and in the machinery or apparatus employed therein.*" A communication. June 14, 1872.

1798.—WILLIAM PORTER MADDISON, of Thornhill Collieries, near Dewsbury, in the co. of York, for "*Improvements in the means of and apparatus for raising water from mines and other low levels.*" June 14, 1872.

1835.—RICHARD ALPHAEUS GOODING, of Manchester, in the co. of Lancaster, for "*Improvements in apparatus for measuring liquids.*" June 18, 1872.

1836.—THOMAS LAMBERT, of Short Street, New Cut, Lambeth, in the co. of Surrey, and EDWIN JAMES WHITE, of Overton, Maisemore, in the co. of Gloucester, for "*Improvements in self-closing valves or cocks for drawing off water.*" June 18, 1872.

1864.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in stench-traps, and in apparatus for making the same and other curved or partly curved articles.*" A communication. June 20, 1872.

1880.—WILLIAM MORGAN BROWN, of the firm of Brandon and Morgan Brown, 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris, engineers and patent agents, for "*An improved apparatus for extracting ammonia in the form of liquid ammonia from crude ammoniacal liquors.*" A communication. June 22, 1872.

1886.—JOHN THOMAS, of 88, Paul's Terrace, Middlesborough, in the co. of York, for "*Improvements in furnaces for generating gas and melting metals.*" June 22, 1872.

1898.—THOMAS ATKINS, of St. Albans, in the co. of Herts, civil engineer, for "*Improvements in pumps, parts of which improvements are also applicable to other purposes.*" June 24, 1872.

1899.—PAUL EMILE CHAPPIUS, of 69, Fleet Street, in the City of London, optician, for "*Improvements in the manufacture and application of reflecting surfaces for the better reflection and diffusion of light.*" June 24, 1872.

1900.—JUBAL SAGAR, of California, U.S.A., at present residing in Leeds, in the co. of York, for "*Improvements in machinery or apparatus for raising and forcing water or other fluids.*" June 24, 1872.

1914.—JOSEPH TOWNSEND, of Glasgow, in the co. of Lanark, N.B., manufacturing chemist, for "*Improvements in furnaces or apparatus for obtaining heat or gases from coal or other substances containing carbon.*" June 25, 1872.

1931.—JOSEPH STEER CHRISTOPHER, of Lombard Court, in the City of London, gentleman, and JAMES FREDERICK LACKERSTEEN, also of the above address, civil engineer, for "*Improvements in the manufacture of hydrogen gas.*" June 26, 1872.

1936.—WILLIAM HEMPSON DENHAM, of Southsea, in the co. of Hants, PERCY VERE DENHAM, and ALGERNON ASTLEY DENHAM, of Putney, in the co. of Surrey, for "*Improvements in water-closets and in apparatus connected there-*

with, parts of which improvements are applicable to other purposes." June 26, 1872.

1940.—WILLIAM WRIGHT, of Sheffield, in the co. of York, plumber, for "*Improvements in taps and apparatus for flushing water-closets, and in taps for other purposes.*" June 27, 1872.

1945.—JOHN MILLWARD, of Curzon Chambers, Paradise Street, Birmingham, in the co. of Warwick, civil engineer, for "*Improvements in hydrants for supplying fire-engines from street-mains.*" A communication. June 27, 1872.

1947.—WALTER MANTELL PARKER and JOHN RENNIE ROBSON, both of Alton, in the co. of Hants, engineers, for "*Improvements in steam and other motive-power engines and pumps.*" June 27, 1872.

GRANTS OF PROVISIONAL PROTECTION.

1533.—JOSEPH RODNEY CROSKEY, of 43, Portsdown Road, Maida Hill, London, Fellow of the Society of Arts, for "*An improved method or process of treating asphalte or bitumen whilst being laid down for pavements and previously thereto, and of constructing pavements having an asphaltic or bituminous surface.*" May 20, 1872.

1593.—LUIZ AUGUSTO DA COSTA, of 35, King Street, Cheapside, in the co. of Middlesex, merchant, and THOMAS LAWRIE, jun., of 37, Woodstock Road, Shepherd's Bush, in the co. of Middlesex, architect, for "*Improvements in the construction of traps, waste-plugs, or gullies for baths, sinks, drains, and other conduits of water or other fluids.*" May 25, 1872.

1683.—THOMAS HACK, of the West Middlesex Water-Works, Hammersmith, in the co. of Middlesex, civil engineer, for "*Improvements in pipe-connexions.*" June 4, 1872.

1687.—ROBERT CAREY, of 5, Radcliffe Villas, Shakespeare Road, Brixton, in the co. of Surrey, for "*Improvements in rotary pumps, applicable also as fluid-meters.*" June 4, 1872.

1707.—DANIEL VINCENT, of Erith, in the co. of Kent, manager of gas-works, for "*Improvements in apparatus for distributing liquid, particularly applicable to gas-scrubbers.*" June 5, 1872.

1708.—CHARLES WEIGHTMAN HARRISON and ALFRED HORATIO HARRISON, both of High Holborn, in the co. of Middlesex, engineers, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" June 5, 1872.

1747.—ALEXANDER MELVILLE CLARK, of 53, Chancrey Lane, in the co. of Middlesex, patent agent, for "*An improved fastening for the lids or covers of gas-retorts.*" A communication. June 10, 1872.

1762.—CHARLES FREDERICK HENGST, of Fulham, in the co. of Middlesex, engineer, and JOHN BELL MUSCHAMP, of Kensington, in the co. of Middlesex, gentleman, for "*Improvements in the manufacture of gas, and in the apparatus employed therein.*" June 11, 1872.

1768.—GEORGE ANDERSON, of Dalmeny Oil-Works, in the co. of Linlithgow, and JAMES BUCHANAN, of the same place, for "*Improvements in apparatus for drawing the charge from retorts employed in making gas or oil.*" June 12, 1872.

1771.—HUGH SHANKS, of South Queensferry, in the co. of Linlithgow, N.B., for "*Improvements in drawing retorts, and in the means employed therefor.*" June 12, 1872.

1783.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in rotary pumps and engines, and in means for effecting the transmission of power thereby, parts of which improvements are applicable to the construction of rotary blowers and ventilators*" A communication. June 13, 1872.

1791.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in the separation and utilization of volatile and condensible gases, and in the machinery or apparatus employed therein.*" A communication. June 14, 1872.

1798.—WILLIAM PORTER MADDISON, of Thornhill Collieries, near Dewsbury, in the co. of York, for "*Improvements in the means of and apparatus for raising water from mines and other low levels.*" June 14, 1872.

1835.—RICHARD ALPHAEUS GOODING, of Manchester, in the co. of Lancaster, for "*Improvements in apparatus for measuring liquids.*" June 18, 1872.

1836.—THOMAS LAMBERT, of Short Street, New Cut, Lambeth, in the co. of Surrey, and EDWIN JAMES WHITE, of Overton, Maisemore, in the co. of Gloucester, for "*Improvements in self-closing valves or cocks for drawing off water.*" June 18, 1872.

1864.—WILLIAM EDWARD NEWTON, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in stench-traps, and in apparatus for making the same and other curved or partly curved articles.*" A communication. June 20, 1872.

NOTICES TO PROCEED.

347.—ROBERT PUNSHON, of the town and co. of Newcastle-upon-Tyne, gentleman, for "*Improvements in apparatus for measuring and registering liquids.*" Feb. 3, 1872.

462.—CHARLES WILLIAM EARLE MARSH, of Lawrence Pountney Lane, in the City of London, civil engineer, for "*Improvements in meters or apparatus for measuring water or other liquids.*" Feb. 14, 1872.

472.—THOMAS JOHNSON, of Plumstead, in the co. of Kent, for "*Improvements in valves for sewers or drains for preventing or arresting the passage of noxious or offensive gases.*" Feb. 14, 1872.

516.—HENRY DEFRIES, of the firm of Jonas Defries and Sons, of Houndsditch, in the co. of Middlesex, for "*Certain improvements in railway-carriage, street, and other lamps.*" Feb. 17, 1872.

1673.—STEPHEN THOMAS WENTWORTH, of Queen Street, Cheapside, in the City of London, gas-fitter, for "*Improvements in burners for consuming gas and air combined.*" June 3, 1872.

1679.—CHARLES WEIGHTMAN HARRISON and ALFRED HORATIO HARRISON, both of High Holborn, in the co. of Middlesex, engineers, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" June 3, 1872.

1708.—CHARLES WEIGHTMAN HARRISON and ALFRED HORATIO HARRISON, both of High Holborn, in the co. of Middlesex, engineers, for "*Improvements in the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.*" June 5, 1872.

1748.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in pistons for steam and other engines and pumps.*" A communication. June 10, 1872.

1768.—GEORGE ANDERSON, of Dalmeny Oil-Works, in the co. of Linlithgow, and JAMES BUCHANAN, of the same place, for "*Improvements in apparatus for drawing the charge from retorts employed in making gas or oil.*" June 12, 1872.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1629.—JOHN SNAPE, "*Improvements in pumps.*" May 27, 1869.

1656.—ABRAHAM HEMINGWAY, "*Improvements in slide-valves.*" May 29, 1869.

1683.—HENRY HOLDREGE, "*Improvements in the process of making gas for illuminating, heating, and other purposes, and in apparatus for the manufacture thereof.*" May 31, 1869.

1697.—JOHN FLETCHER, "*An improvement in steam and other cocks, applicable to union joints.*" June 2, 1869.

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	23 — 24
5000	20	Bahia (Limited)	20 0 0	3 0 0	11⅞ — 12¼
1000	20	Do., preference	20 0 0	10 0 0	23 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	21 — 23
40000	5	Bombay (Limited)	5 0 0	6 15 0	6¼ — 6⅝
10000	5	Do., third issue	4 0 0	6 15 0	1—1½ pm.
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	35 — 36
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19 — 20
120000	10	*Chartered*	10 0 0	10 0 0	15⅞ — 16¼
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	7 — 7½
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	13 — 14
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	3¼—3½ pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
12000	25	Do., D shares	25 0 0	10 0 0	48½ — 49½
17490	100	*Commercial*	100 0 0	10 0 0	167 — 170
20000	20	Continental Union	20 0 0	8 0 0	25 — 26
10000	20	Do., new	10 0 0	8 0 0	3 — 4 pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	24½ — 25½
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16½ — 17½
5000	10	Do., preference	10 0 0	6 0 0	11¼ — 12
6624	10	Do., new shares	10 0 0	7 0 0	13¼ — 14½
3376	10	Do.	1 0 0	7 0 0	1—1½ pm.
23406	10	European (Limited)	10 0 0	11 0 0	15⅝ — 16½
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	3¼—3½ pm.
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13½ — 14½
1560000	100	*Imperial*	100 0 0	10 0 0	168 —170
26000	12½	Do., new shares	12 10 0	7 0 0	16½ — 16¾
25000	12½	Do., new shares, 1870	10 0 0	7 0 0	13 — 14
1360	100	Do., bonds	£100	10 0 0	195 — 200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	67½ — 68½
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	66 — 68
3000	10	Do.	10 0 0	5 0 0	7½ — 8½
3000	20	Do.	20 0 0	7 10 0	24½ — 25½
250000	Sk.	*London*	100 0 0	10 0 0	167 — 170
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 —120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11628	100	Do., 2nd preference stock	100 0 0	5 0 0	
8000	10	Nictheroy, Brazil (Limited)	10 0 0		1⅛—1¼ dis.
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3¾ — 4¼
6000	5	Do., preference	5 0 0	7 0 0	5⅞ — 6⅛
20000	5	Mauritius (Limited)	2 0 0	6 0 0	2½ — 2⅝
80000	5	Oriental (Calcutta)	5 0 0	9 0 0	7¼ — 7⅞
30000	5	Do., new shares	2 10 0	9 0 0	1¼—1⅝ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2½
17500	10	Pará (Limited)	10 0 0	6 0 0	10 — 10½
27000	20	*Phœnix*	20 0 0	10 0 0	33 — 34
3000007.	100	Do., new	45 0 0	7 10 0	14— 16 pm.
1440007.	Sk.	Do.	100 0 0	5 0 0	89 — 91
5000	20	*Ratcliff*	20 0 0	10 0 0	33 — 35
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	37 — 39
7359	5	Singapore (Limited)	5 0 0	7 0 0	5 — 5¼
2000	5	Do., preference	5 0 0	7 10 0	5¼ — 6
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	88 — 90
4000	12½	Do.	12 10 0	10 0 0	22 — 24
20000	12½	Do., new shares	2 10 0	10 0 0	5 — 6 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16½ — 17½
10000	10	Do., new	6 0 0	10 0 0	4½ — 5½
9000	4	United General (Limerick)	4 0 0	5 0 0	3 — 3½
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	13 — 14
1500	10	Do.	10 0 0	7 10 0	7¼ — 8
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
40000	10	Western (Limited) A, B, & C shares	10 0 0	10 0 0	16½ — 17⅛
20000	10	Do., D shares	1 0 0	10 0 0	3¼—4 pm.
16000	5	*West Ham*	5 0 0	9 0 0	7¼ — 7½
10000	5	Do., new shares	1 0 0	9 0 0	1½ — 1⅝
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

CASTINGS.—*Per Ton.*

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordshire
	£. s. d.	£. s. d.	£ s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	6 10 0	5 9 6	5 10 0	5 17 6	5 15 0
1¼ and 2-inch Socket-pipes	10 2 6	9 2 6	9 0 0	9 7 6	9 12 6
2½ and 3-inch ditto	8 7 6	8 7 6	8 0 0	8 7 6	8 12 6
4 and 5-inch ditto	9 17 6	8 2 6	7 17 6	8 5 0	8 10 0
6 inches and upwards ditto	8 17 6	7 17 6	7 12 6	8 0 0	8 7 6
Retorts, 1st fusion, hot blast	8 12 6	7 12 6	7 7 6	8 2 6	8 12 6
Ditto, 2nd ditto, cold ditto	9 12 6	8 12 6	8 7 6	9 2 6	9 12 6
Tank-plates, ¼ thick and above	9 2 6	8 2 6	7 17 6	8 12 6	10 2 6

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign.*—	Per Keel.
	s. d.		£ s.
Chatham and Rochester	7 0	Barcelona	22 0
Cork	9 0	Bordeaux	8 0
Dover, Folkestone, & Ramsgate	7 6	Boulogne and Calais	8 15
Dublin	8 6	Cadiz	11 5
Exeter Quay	9 9	Cronstadt	12 10
Ipswich	6 6	Copenhagen	10 0
London (from Leith)	—	Genoa	20 5
London (Pool)	7 0	Hamburg	8 0
Lowestoft and Yarmouth	5 6	Havre de Grace	9 10
Portsmouth & Southampton	7 0	Leghorn	19 5
Plymouth	7 3	Lisbon	11 0
Shoreham	6 0	Rotterdam	8 10
Whitstable	7 3	Stettin	11 5
Weymouth	7 9	Trieste	20 10
		Venice	22 5

TURNER & ALLEN,

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English and Foreign Agents:

JAMES MILLER, SON, & CO.,

1, GREAT ST. HELEN'S, LONDON, E.C.,

AND

75, UNION STREET, GLASGOW.

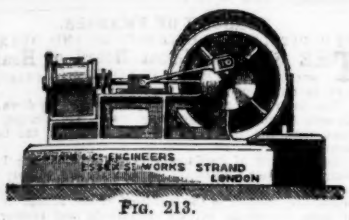

FIG. 213.

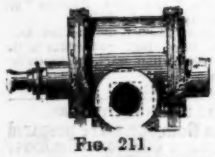

FIG. 211.

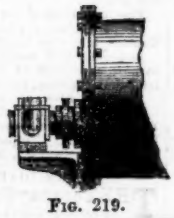

FIG. 219.

GWYNNE & COMPANY,

HYDRAULIC, MECHANICAL, & GAS ENGINEERS,

ESSEX STREET WORKS, STRAND,

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SOLE MANUFACTURERS OF

BEALE'S IMPROVED PATENT GAS-EXHAUSTER,

Under the personal superintendence of Mr. BEALE.

REDUCED PRICES AND INCREASED CAPACITY.

Also manufacturers of Improved Hydraulic Regulators, to actuate a steam or gas throttle-valve to suit the make of gas; self-acting bye-pass valves, to move by hand or otherwise; improved stop-valves, with faced flanges, forming the neat adjunct to Exhauster of valve and elbow combined. Exhausters manufactured on the new principle have given the utmost satisfaction, and can be seen working at several large Gas-Works in London. **G. & Co. are now engaged in manufacturing the largest Gas-Exhausters in the world, with engines complete.**

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Fig. 213 shows the Improved Gas-Exhauster attached to, and driven by one of GWYNNE AND CO.'s well-known high-speed Horizontal Steam-Engines, without any intermediate gearing. This arrangement is extremely compact, and is beautifully adapted for small or large Gas-Works, and the foundations and erection are both very simple and inexpensive.

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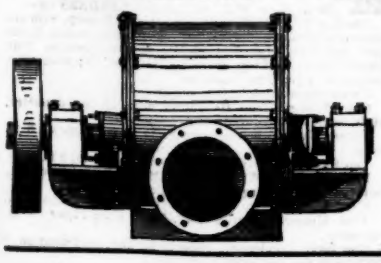

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Apply, with references, &c., to Bonnington Chemical Company, Leith.

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Address 7, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TO CANNEL PROPRIETORS.

THE Directors of the Chester United Gas Company invite TENDERS for the supply of about 2500 tons of CANNEL per annum, for One or Three years. The Cannel to be delivered free of all rates at the general railway station, Chester.
The Directors do not bind themselves to accept the lowest or any tender.
Tenders to be addressed and sent to the undersigned on or before Monday, the 15th day of July next.
James Pye, Secretary.
Roodee, Chester, June 28, 1872.

BOROUGH OF SALFORD.

THE Gas Committee of the Borough of Salford are prepared to receive TENDERS for One, Two, or Three years, for all the GAS-METERS they may require.
Particulars can be obtained from the Manager, at his Office, Gas-Works, Lamb Lane.
The Committee do not bind themselves to accept the lowest or any tender.
Tenders to be delivered at the Gas-Works, Lamb Lane, on or before Monday, the 15th of July, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Meters."—By order,
Edwin Andrew, Town-Clerk.
Town-Hall, Salford, June 28, 1872.

FOR SALE, a Vertical Condenser, consisting of 12 double rows of 6-in. pipes, with arch pipes, bottom box 12 ft. 6 in. long, tar pipe, and dip bucket, all in good condition.
For prices and further particulars, apply to H. Cranmer, Manager, Gas-Works, Stratford-upon-Avon.

FOR SALE, at the Tonbridge Gas-Works, three small GASHOLDERS, one 30 ft. by 10 ft., with 5 columns, Tiron girders, carriages, and rollers; also one of 25 ft. by 12 ft., with same number of columns, &c., and one 25 ft. by 14 ft. nearly new, 4 columns, &c. Also 4 Purifiers, 5 ft. by 5 ft. by 4 ft. 9 in., with four 5-in. Bryan Donkin's valves, bends, Ts, &c., some wood sieves; also a piece of round hydraulic main, 6 ft. long.

FOR SALE, Two Purifiers, 4 ft. square, equal to new, with covers, valves, and 3-in. connexions complete.
One 10-ft. length 12-in. D HYDRAULIC MAIN, with six 3-in. dip, H, and ascension-pipes and side saddle sockets complete.
WANTED to purchase, 400 yards of 3 or 4 in. second-hand MAIN-PIPES in good condition.
Apply to the Manager, Gas-Works, Tenterden, Ashford, Kent.

TO TAR DISTILLERS.

THE Directors of the Independent Gas- light and Coke Company are prepared to receive TENDERS for the TAR produced at their works, at Haggerston, for One year, from the 31st of July, 1872.
Tenders to be sent to me, on or before Tuesday, the 16th day of July, endorsed "Tender for Tar."
The Directors do not bind themselves to accept the highest or any tender.—By order,
James B. Coulson, Secretary.
236, Kingsland Road, June 12, 1872.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

CONTRACT FOR COAL.

THE Directors of this Company are pre- pared to receive TENDERS for about 10,000 Tons of GAS COAL.
Particulars and conditions of tender to be obtained on application to the Engineer, at the works.
Tenders to be sent in by the 6th of July proximo.
North Street, Wandsworth, June 11, 1872.

COAL TAR AND AMMONIACAL LIQUOR.

THE Corporation of Paisley invite TENDERS for the TAR and LIQUOR produced at their Gas-Works, Blackstone Road, for a period of from Three to Five years, as may be agreed upon, from the 15th of July, 1873.
The Tar and Liquor to be sold separately, and both at a rate per 100 gallons—the latter according to strength, taking 2½ degrees (Twaddell) as the minimum, and advancing at a rate for each half degree added. Terms—Monthly payments.
The Contractor to furnish an abundant and regular supply of casks, and take delivery at the works. Facilities will be given him for their removal by railway, which communicates with the works.
Sealed tenders, marked "Tender for Tar and Liquor," to be lodged with William Hodge, Esq., Town-Clerk, Paisley, on or before the 12th of July next.
The Corporation will not be bound to accept the highest or any tender.—By order,
Geo. R. Hislop, Engineer and Manager.
Gas-Works, Paisley, May 30, 1872.

TO BUILDERS AND CONTRACTORS.

THE Directors of the Broseley Gas Com- PANY, Limited, invite TENDERS for the necessary Buildings, Brick Gasholder Tank, &c., for their works at Broseley.
The plan and specifications may be seen on and after the 4th of July next, at the Offices of Mr. E. B. Potts, Solicitor, Broseley, or tracings and copies of the specifications may be obtained from Mr. Tom Abercrombie Hedley, the Engineer of the Company, Wolverhampton, and 3, Abchurch Lane, London, E.C., upon payment of 20s.
Tenders will be received until twelve o'clock in the morning of the 17th of July, but the Directors do not bind themselves to accept the lowest or any tender.
June 19, 1872. By order.

SIDMOUTH GAS-WORKS, DEVONSHIRE.

TO BE SOLD by Auction, at the London Hotel, Sidmouth, on Wednesday, the 24th day of July, at four o'clock in the afternoon, subject to the conditions which will be then and there produced, the SIDMOUTH GAS-WORKS, in the occupation of Mr. Henry Ellis, comprising a large Gas-House, with bed for 12 retorts, Condensers, Scrubber, 2 Purifiers about 6 ft. by 6 ft. by 3 ft., and 2 Gasholders, one built within two years, with cast-iron Tank constructed to hold 9000 cubic feet of gas and the other capable of holding nearly the same quantity, together with cottage, coal stores, and smith's and fitting shops, &c.
There are several miles of MAINS, from 5-in. downwards, which, with the Public Lamps and Lamp Posts belonging to the vendors, will be included in the purchase.
As the agreement under which the present occupier and joint owner is carrying on the works expires in August next, possession will be given on completion of the purchase, when the purchaser will be required to take at a valuation the existing stock of coals, coke, &c., and also all meters, tools, implements, and tenant's fixtures.
The population of Sidmouth is upwards of 3300, and there are at present about 80 public lights, but there can be no doubt that on the completion of the proposed railway the consumption of gas, for both public and private lights will be greatly increased.
The land on which the above works and buildings are erected is held for the residue of a term of 2000 years.
Further particulars may be obtained on application to Mr. Henry Ellis, at the works; to Mr. Edward Millington, Land Agent and Surveyor, Holbeach, or to Messrs. Radford and Williams, Solicitors, Sidmouth.
Sidmouth, June 24, 1872.

BOROUGH OF SWANSEA.

TO CAPITALISTS, CONTRACTORS, AND OTHERS.

THE Swansea Local Board of Health are prepared to receive TENDERS for the supply of GAS for a term of not less than Ten years.
The Contractor or Lessee to provide and lay down, at his own expense, the necessary mains, and connect the same with the Lamp Pillars and Lamps of the Local Board.
No new Act of Parliament is required, as the Local Board, or their Contractor or Lessee, are already empowered by statute to break up the streets and lay the pipes, and, subject to the lighting of the streets or any of them, to supply private consumers, and recover the Gas Rents.
The population of the borough is 52,000.
For particulars and forms of tender, apply to Mr. Edward Cousins, Surveyor, Guildhall, Swansea.
Sealed tenders, marked "Gas Tender," to be delivered by post, addressed to "The Town-Clerk, Swansea," not later than Monday, the 8th day of July, 1872.
Richard Aubrey Essery, Town-Clerk, &c.
N.B.—The Corporation have land contiguous to the Docks, and at the lowest level, which might be treated for by any new Gas Company.
Guildhall, Swansea, May 13, 1872.

TO TAR DISTILLERS AND OTHERS.

THE Torquay Gas Company are prepared to receive TENDERS for about 80,000 GALLONS of TAR to be taken during the ensuing twelve months
There is a siding at the works in connexion with the Dartmouth and Torbay Railway Company's line.
Particulars can be obtained, and tenders to be sent to the undersigned, on or before Saturday, the 13th of July next. James Greenfield, Manager.
Hollacombe, Paignton, June 28, 1872.

TO GAS ENGINEERS, IRONFOUNDERS, AND MANUFACTURERS OF GAS APPARATUS.

THE Directors of the Broseley Gas Com- PANY, Limited, invite TENDERS for the IRON APPARATUS, Cast-Iron MAIN PIPES, &c., for their works at Broseley.
The plans and specifications may be seen on and after the 4th of July next, at the Offices of Mr. E. B. Potts, Solicitor, Broseley, or tracings and copies of the specifications may be obtained from Mr. Tom Abercrombie Hedley, the Engineer of the Company, Wolverhampton, and 3, Abchurch Lane, London, E.C., upon payment of 30s.
Tenders will be received until twelve o'clock in the morning of the 17th of July, but the Directors do not bind themselves to accept the lowest or any tender.
June 19, 1872. By order.

ST. JOHN'S GAS-WORKS, PORTO RICO.

MR. J. E. STEINACHER, Gas Engineer, Porto-Rico, W.I., will receive TENDERS for—
One GASHOLDER, 44 ft. diameter, 12 ft. deep, with six cast-iron columns, girders, balance-weights, chains, inside bars, and everything, all complete, of best materials. Side sheets No. 15, and top or roof sheets No. 14, with inlet and outlet pipe, 8 in. diameter.
Two Syphons for inlet and outlet.
One Wrought-Iron Hydraulic Main, 18 in. diameter, 20 ft. long, for two ovens of five retorts.
Fifteen Cast-Iron Ascension Pipes, 4 in. diameter, 3 ft. long.
Ten Cast-Iron Retorts, oval, 15 by 22 in., and 8 ft. long.
Fifteen Cast or Wrought-Iron Mouthpieces for retorts, with patent fastening and self-acting lids.
Fifteen H-Pipes for ascension-pipes and hydraulic main.
Two Hundred Yards Cast-Iron Main-Pipes, 8 in. diameter.
One large Condenser, enough for the condensation of 3000 cubic feet per hour.
One Set of Four or Six Cast-Iron Purifiers, 5 ft. 4 in. square, 4 ft. deep, 3 divisions inside, complete, with a Walker's patent centre-valve.
One Gas Station Meter, to pass 3000 cubic feet per hour.
One Gas Governor or Pressure Regulator.
Two Hundred Lamp-Post Columns, 9 ft. high from base to top, with lanterns, for Street.
Fifty Cast-Iron Brackets, to put in walls, 3 ft. long, with lanterns, for street.
Two Hydraulic Valves for main-pipes.
Tenders to be sent on or before Friday, Aug. 30, 1872.
Porto Rico, June 9, 1872.

CAST-IRON Retorts, Socket-Pipes, with Syphons, and all requisite Connexions, Lamp Columns, Wrought-Iron Tubing, Valves, Street-Lamps, Sight Holes, Furnace Doors, Ash-Pans, Charging and Coke Shovels, Iron Pails, Coke Barrows, Cross Bars, Fire Pots, Pumps, and Iron Borings.
PURIFIERS, CONDENSERS, & SCRUBBERS erected complete, or the materials supplied; and every description of goods in use by Gas-Works, in stock, at wholesale prices, at
Mr. LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street, London.

TO GAS COMPANIES, ENGINEERS, CONTRACTORS, AND OTHERS.

GEORGE NEWTON,
UNION STREET WEST, OLDHAM,
BRASS FOUNDER AND FINISHER,
MANUFACTURER OF
IMPROVED WET AND DRY CONSUMERS GAS-METERS,
LAMP METERS AND BOXES,
GOVERNORS, GAUGES, INDICATORS, EXHAUST & PRESSURE REGISTERS,
GAS STATION-METERS,
With all the joints planed.
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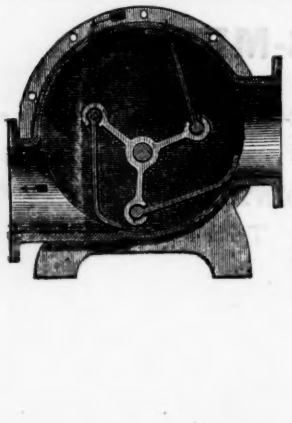

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PATENT
GAS EXHAUSTER.
(From 250 Feet upwards per Hour.)
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ROTARY TAR AND OIL PUMPS.
For particulars and prices apply to the Patentee,
22, Wharf Road, City Road, London, N.

CONTENTS.

	PAGE
Notes upon Passing Events:—	
The New Street to the Thames Embankment and Northumberland House	605
Roads to the East	605
The Cause of Strikes	605
Mr. Ayrton and Dr. Hooker	606
Wife-beating and the Lash	606
Musical Speculations	606
Civil Service Trading	606
Paupers and Criminals	607
The Education of Pauper Children	607
Leading Article:—	
The Public Health Bill	607
Circular to Gas Companies:—	
Gas-testing without Referees	608
Recent Results of Purification at Bow and Beckton	608
An American on the Gas Referees	608
The Gas Accounts for 1871	609
Advances in the Price of Gas	609
The Chief Gas Examiner's Quarterly Report	609
The Scheme for the Amalgamation of the Western and Chartered Companies	609
The Patent Gas Company	609
The Cheltenham Gas Bill	609
Correspondence:—	
The Collection of Gas Accounts	609
Patent Gas	609
Price of Coke	610
A Defence	610
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	610
Progress of Bills in the House of Commons	610
House of Commons Committee—Cheltenham Gas Bill	611
Legal Intelligence:—	
Exeter City Quarter Sessions—The Exeter Water Company *v.* The Justices of Exeter	619
Miscellaneous News:—	
Metropolitan Board of Works	620
Sale of the Sidmouth Gas-Works	621
Report of the Chief Gas Examiner on the Metropolitan Gas Supply	621
Major Bolton's Reports on the Metropolitan Waters for May and June	621
Bradford Corporation Gas-Works—The Proposed Increase of Price Negatived	622
Opening of the New Offices of the Liverpool United Gaslight Company	623
The Institution of Civil Engineers	624
Dr. Stevenson's Report on the Illuminating Power of the Gas supplied in St. Pancras, in May and June, 1872	624
Dr. Whitmore's Report on the Quality of the Water supplied in St. Marylebone, in June, 1872	624
Dr. Whitmore's Report on the Quality of the Gas supplied in St. Marylebone, in June, 1872	624
Price of Gas at Heywood	624
Stoke-on-Trent Gas Company	624
Transfer of the Bolton Gas-Works to the Corporation	624
Appointment of a Gas Manager at Middlesborough	624
Gas Agitation in Bordeaux	624
Gas Supply of Hull	625
Proposed Purchase of the Heckmondwike Gas-Works by the Local Board	625
Transfer of the Dewsbury and Batley Gas-Works	625
Serious Explosion on a Steamer	625
Gas Explosion at the Brunswick Hotel, Sheffield	625
Breaking Street-Lamps	625
Conviction for Pouring Gas-Tar into a River	625
Fatal Accident at the Neepsend Works of the Sheffield Gas Company	625
Explosion of Gas at Wentworth House	625
Lighting the Houses of Parliament	625
Halifax Water Supply	625
Cadiz Water-Works Company	625
Supply of Water to Lambeth	625
Water Supply of South London	625
Water Supply of Oldbury	626
North Shields Water Company	626
Dearth of Water in Bermondsey	626
The Institution of Civil Engineers	626
The Manufacture of Anthracene	626
Coal in the North of Scotland	626
Register of New Patents:—	
Applications for Letters Patent	626

TO CORRESPONDENTS.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 16, 1872.

Notes upon Passing Events.

The Metropolitan Board has embarked in a negotiation which, if successful, will do them more good with the public than anything they have completed, scarcely excepting the Embankment. The main drainage, greater than the *Cloaca Maxima* of Imperial Rome, is out of sight, and so are many of their minor works of permanent utility. The Board has reopened the proposals for purchasing Northumberland House—next door to the truss-maker's, as Mr. Matthew Arnold pleasantly reminded us Philistines a few years ago. Now, with Northumberland House cleared away, and the site adapted to a grand street on the Embankment, all the magnificence of Trafalgar Square—in spite of the National Gallery and the Nelson Column—all the splendid simplicity and utility of the Northern Embankment as part of a thoroughfare in connexion with the Regent Street series of streets, will be developed at once. The way to and from the City will be made plain at a glance, and wheeled traffic which never ventured through the straits of Temple Bar, and up the inclines of Ludgate, through the dangerous gut of St. Paul's Churchyard, will be called into existence. The difficulties of the bargain are not slight. It is true that the hideous pile of Northumberland House, in the worst style of Carpenter's architecture, is no longer a desirable residence. It never has been since a duke, with an eye to the main chance, sold a slice of the stately garden, that used to reach to the Thames, for coal wharves. It is not an edifice of which any family can be proud. Nothing is ancient about it except the site, and that site is almost as much out of place as a bishop's palace and gardens in Ely Place, or the palace where they cut your hair at the top of the Inner Temple Lane. Still we must remember that the duke is not supposed to be a willing vendor. The house connects his family with the original Percys, and that is not an idea to be overlooked. The price of Northumberland House would enable the duke to erect a town mansion, within the limits assigned by modern fashion, in a style of architectural magnificence which the spirit of the age requires where an ancient family can call on the resources of almost unlimited wealth. The late duke ruled almost royally and paternally in the North, and thought no sacrifice too great to support the traditions of a beneficent rule; but in London he was almost inaccessible, except through the professional counsel which regulates most noble estates. The present duke is more a man of the world, was a member of the House of Commons, and it may be presumed is not insensible to the popularity that he may acquire by meeting the wishes of the metropolis, and at the same time realizing the full value of his splendid property. From the spirit in which the negotiation has been opened we may expect a happy termination—a grand street opening Charing Cross to the Embankment, flanked on either side by palatial houses worthy to harmonize with the Charing Cross Hotel.

The success of the Suez Canal—that is, the success as a mode of transit at the expense of the unfortunate shareholders—has proved a benefit to the British mercantile interest that was to have been ruined by it, and ruin to the French papists who sought the double gain of a profitable investment and a national triumph. With the canal in full work, the flag of England covers four-fifths of the tonnage. The national result of this engineering triumph, for which M. de Lesseps and his countrymen deserve the full credit, is to turn attention to other modes of shortening the route to our Indian empire, and if peace continues and money plentiful, some of the railroad schemes will certainly be launched, wild as the greater number seem. The great practical question is whether the Ottoman empire can be kept financially afloat for another ten years, because if that feat of balancing can be effected Turkish railways are and will be pushed on bit by bit until the starting-point of an Anglo-Indian line—a very serious question—will be virtually settled. Dr. Hyde Clarke, who is so familiar with every phase of the question, has pointed out in a letter to a contemporary that "by the end of next year the European system "will be continued to the Bosphorus and to Salonica, and will be "connected with the Asiatic section which has now reached Ismid."

Strikes are the order of the day; that is a matter of course, when to ask is almost to have. In every instance there has been a foundation for a real grievance. The strikes begin in the very low-wages districts, and extend, by force of example, to the ranks of the best paid. For instance, it is now well known that the revolution in the mechanical engineers—initiated at Newcastle-on-Tyne—arose from the unreasonably low wages paid there. Manufacturers in the Midland counties, when asked to contribute to the employers fund against the strike, were astonished and somewhat disgusted to find that the Newcastle employers were not paying their skilled hands more than 25s. a week. These employers ought never to have let the thing go to a strike, but have, on the first application, raised wages. So say the Midland manufacturers, whose prices—that is, trade—will be seriously affected by the increased cost of short-hour labour. So with the strike of agricultural labourers: it began in the grossly underpaid districts; it has extended to those where farm servants were getting almost mechanics wages. The old story: "The good "must pay for the bad." We may say that, as a rule, the time had come for an increase in wages in many trades, to meet the cost of meat and fuel. But the most impudent thing we have heard of is the strike of the Thames lightermen, the members of the Watermen's Company—close monopolists—who claim to be paid for the exclusive privilege of sitting in barges towed by steam-tugs, whether they have anything to do or not. It is in

this body of monopolists that the watermen are found extorting money, at Dock and Tower Stairs and Gravesend, from every helpless female or foreigner. Should this strike be maintained, it may help to convince Parliament, the next time a Bill on the subject is introduced by the Conservators of the Thames for abolishing the privileges of watermen and lightermen, that these are not the sort of people to be trusted with the exclusive rights of an ancient monopoly.

If Mr. Ayrton, whose talent for making himself disagreeable almost amounts to an art, would proceed to vent some of his superfluous offensiveness on the chair-letters in Hyde Park, there is really a very pretty opening for his talents. That is, if the regulation of the lessees rests with the First Commissioner, and not with the deputy ranger. The chairs are not satisfactory, especially the arm-chairs, which cost twopence and are a nuisance. Why not introduce the Parisian plan, people, and chairs? There the arm-chair is really a comfort and worth an extra payment; there there are no rival proprietors, and one ticket enables you to sit where you please, and change your seat when it suits you. But Mr. Ayrton flies at higher game. Having worried and insulted Mr. Edward Barry to his heart's delight, he is now enjoying himself by exercising his authority over Dr. Hooker, the distinguished traveller, author, and administrator of Kew Gardens. The Norfolk squire who congratulated himself on not finding one of those damned men of genius in Addington's Cabinet was of the same order of mind as the First Commissioner of Works. Mr. Ayrton was bred an attorney, and has all the worst tricks of the trade, without the civilizing results which intimacy with well-bred clients of superior rank sometimes gives. He looks on the victims who have the misfortune to be his official subordinates as he did on the Bombay natives. If they have been enjoying the respect and influence due to scientific and literary abilities, so much the worse for them; he will show them who is master. Without notice at all in the first instance, and in his chronically uncourteous manner, when asked for an explanation, Dr. Hooper—who, to the great advantage of botanical and horticultural science, had reigned supreme at Kew—found himself superseded in one department by a subordinate. In other words his officers were told simply not to pay any attention to his orders. It is quite possible that the time had arrived when it was necessary to bring Kew, with other institutions, into a more orderly and regular condition as to accounts. Irregularities will creep into long-established departments. But gentlemen of high reputation and undoubted integrity—men like Dr. Hooker—who have sacrificed everything for the advancement of their favourite studies, are not to be treated by their accidental superior like neglectful schoolboys or inattentive clerks. The correspondence between Dr. Hooker and the First Commissioner of Works could not have been more needlessly offensive if the office had been held by Mr. Bradlaugh, and all because some much-needed heating apparatus has been erected without Mr. Ayrton's endorsement. Ministries do not last for ever. Mr. Gladstone's must some day be dissolved. Mr. Ayrton has not reached the height of his ambition—the Cabinet. He has been out-topped by Mr. Foster and Mr. Stansfeld. We may safely anticipate that any future Ministry will prefer the worst Mr. Ayrton can do in Opposition to the poisonous effect of his support.

A discussion has been lately carried on in the daily papers as to whether men who beat their wives should be flogged as well as imprisoned, with other hard labour. One set of strong-minded females advocate the lash; they mean that what is sauce for the goose is sauce for the gander. Another section of the same sisterhood object vehemently. They say that the wife-beater will be still further degraded by the application of the cat with nine tails. The real question is, will flogging diminish the crime—will it deter? If it will not, it is a waste of power; if it will, the end justifies the means. A day at an East-end police office, a sight of the sort of men who would be liable to flogging, would speedily banish the idea of possible degradation from any one of common sense, living in the world, hearing and seeing the ordinary transactions of the class who supply most of the wife-beaters. But with the sentimental, who live in a world of their own, and answer a fact with a fine phrase, it is impossible to argue. At every public school there are brutes who have a positive pleasure in torturing animals and small boys. What keeps such fellows in decent order? First, the superior authority of the master; and, next, the fear of other boys as strong, or stronger, ready to inflict a hearty thrashing on the tyrants. Ask one of the small victims what sort of defence he would expect to find in "moral suasion"—good advice and a tract. For our own part we are not entirely committed to the cat. We have seen refractory members of a militia regiment, tramps of the foulest language, reduced to wonderful docility by a course of shot-piling; but we do not believe that ruffians can be talked into humanity any more than a First Commissioner of Works can be made a gentleman by an Act of Parliament or a leading article.

We have occasionally drawn attention to the "*High Falutin*" style adopted by writers more or less intimately connected with the fine arts, and especially with painting and music. Some of these enthusiasts would have one believe that the principal object of life is to listen to the music of the future in a building covered with frescoes representing legends of the prehistoric ages. Mr. Wagner, one of the great prophets of the incomprehensible, has lately published a work in which he prophesies that the time will come when an audience will flock to a special theatre to hear special operas as the principal business of the day. He protests against people resorting to such places in the evening as a mere amusement. The apostles of this æsthetic school would have us believe that nothing is more likely to reform burglars and refine wife-beaters than a course of appropriate operas and picture galleries. This seems also to be the idea of Mr. Blanchard Jerrold, celebrated as being, not the nephew of his uncle, but the son of his father. In a letter of pitiful complaint to the editor of the *Echo*, he states that he was "last "autumn in Liverpool, on a mission connected with the "amusements of the people." What can this mean? Had he accepted an agency from the Bounding Brothers, or undertaken to get up a match at cricket or foot-ball between a London and a Liverpool team? In either case "mission" is rather a grand term for proceedings weekly recorded in *Bell's Life*. At Liverpool the missionary of amusements met a brother in Mr. Willert Beale, whose name has long been favourably known as a successful speculator in provincial tours of Italian Opera *artistes*, but who has never yet set up for the character of a musical or any other kind of missionary. It seems that the missionary and the speculator came to the conclusion that something might be done—that is, some money might be made—for both by establishing a new kind of concerts, by inducing local societies to compete with each other for prizes as they do on the Continent, and admitting the public to hear them at a shilling a head. This, no doubt, looked very pretty on the paper drawn up by the two missionaries of "popular musical education" "*séance tenante*," but it wanted money to make it go. A large place seated for thousands; prizes to tempt competitors, &c. These conditions were found at the Crystal Palace, where any new sensation in the musical line is acceptable and appropriate A member of the Royal Family was enlisted to bestow the final prizes, and the affair was a moderate success. But as it is difficult to found a republic without republicans, so it is difficult, if not altogether impossible, in an unmusical and busy country like England, to get up the enthusiasm which ordinarily attends the competition of rival choirs and rival bands in the small towns of France, Belgium, and Germany. Mr. Blanchard Jerrold writes in the tone of grief and indignation which would be appropriate if some national disgrace had fallen on the country. He is indignant that the Crystal Palace Company, which found the money, should take the credit of the musical races, and promises if Mr. Beale will found an independent council to itinerate from city to city, getting up musical tournaments, that our English work folks shall "become "accomplished and delightful musicians as certain Welsh miners." So that we presume music-hall ditties will be neglected, and potboys will whistle nothing less correct than the sonatas of Mozart or Beethoven. No one can object to the object, or to Mr. Jerrold making money by it; but why give such grand names to a new form of promenade concerts? In the same style we are called upon to believe that the speculations in the Albert Hall concerts have some higher object than the amusement of the amateurs who direct them, and putting a little money in the treasury of the Commissioners.

Petitions have been presented by Sir Thomas Chambers and Mr. Crawford, numerously signed by tradesmen, against the Civil Service Co-operation Stores, and against Civil Service trading. It is very difficult to understand what the petitioners would recommend if they had their own way. Where is the interference, once begun, to stop? The old-fashioned, highly respectable, and high-priced tradesmen of the West-end, who do not advertise, and who do give credit, will not acknowledge, will scarcely speak to the new generation who largely advertise and sell for cash. Are Civil Service servants to be put on their oath as to the shops in which they shall deal, and the prices they may pay? Suppose the managers of the stores, who happen to be Civil servants, compelled to retire, that will not affect a score in the service. It will not close the stores as long as customers find they can save money by co-operation. This ignorant cry is merely a revival of protests heard a quarter of a century ago, when gigantic shops, on the plan of small profits and quick returns, ate up the little old-fashioned traders. Go to a country town, and you will find the shopkeepers quite ripe for an Act of Parliament for putting down "foreigners" with plate-glass fronts, or for forbiding the squire, the parson, and the doctor, to deal with London tradesmen!

The two great difficulties of the age are paupers and criminals.

They have always been difficulties, but now there is a public opinion on these questions that will not be silent. Of old, criminals were allowed to run about until they were worth—to the constables—hanging-money, and then were strung up in dozens out of the way. As for paupers, they were endured as inevitable as the plague or the small-pox, and were even cultivated. In this country we have gone through the phases of absolute neglect and barbarous cruelty, succeeded by sentimental coddling and cottering, so that a criminal became much better off than a working man, and a pauper boy was educated so as to be only fit for a genteel clerk's situation. As a matter of course, in a country where every public question is debated, discussed in meetings and in newspapers, a healthy reaction has succeeded silly, misdirected philanthropy. Already we have it on official authority that in spite of the deficiency of education, the strength of the drinking interest, and the facilities offered for escape by our criminal law, pauperism and crime are decreasing. We leave for the present the criminals, who have recently occupied the attention of a congress on prison discipline, in which every shade of opinion and experience was represented, and turn to the question of juvenile paupers, now in process of satisfactory solution. To check pauperism children must be caught young, removed from the influence of vicious example, and taught to work. A mere parrot-like literary education without hand labour has been proved to be simply mischievous.

The report of the Local Government Board for 1871-2 is full of encouraging materials. For instance, in a report on the education of pauper children it says:

We have now about 8000 children belonging to London and its vicinity. We venture to lay down the following rules as to their management:—1. They should never be reared with adult paupers. 2. They should be brought up industrially. 3. They should have competent teachers. 4. They are better taught in large than in small schools. 5. It is proportionally cheaper to feed and teach large than small numbers. 6. No school can be well managed where the teachers are continually changing. 7. The chances of a pauper child becoming independent are proportional to the distance of its removal from low relations and haunts of vice with which it has commonly been familiar. The district school system is the best. They have great opportunities for industrial training. Music and seamanship are all but unattainable elsewhere. During 1871, 286 boys trained in music have been enlisted in the royal army and navy. What other plan could train boys for the sea equally to the ship *Goliath*, with its 450 boys? The best teachers seek the largest schools. It is apparent that it is proportionally cheaper to feed and clothe 20 people than 10—100 than 50; less attendance, less fuel are needed; the contracts, being larger, are obtained at a lower price. In large schools the head teachers seldom change. In the three largest metropolitan schools, one has held his post 17 years, another 9, a third 12. In small schools the teachers are constantly changed. Three changes sometimes happen in a year; a teacher seldom remains in the same school three years. The reasons are obvious—better stipends, superior house accommodation, more respect from managers. District schools located out of the union from whence the children are drawn are most likely to dispauperize them. In such schools they are often taught engineering, drawing, carpentry, cooking, sawing by machinery, swimming, &c. Persons are deceived on the question of cost. A boy in the workhouse costs £12 for food and clothing; in a district school, £18. *Ergo*, the latter is the most expensive. There is an error in this comparison. Perhaps the children are half-fed on the cheaper system, or the cost of the building is charged on one side, and not on the other. There must be a fallacy somewhere. Perhaps the cost for industrial appliances explains the difference. Musical instruments used in preparing boys for the army and navy may appear extravagant. The guardians of Marylebone were abused for expending £171 upon band instruments; but in the first year 22 boys were received into army and navy bands, with a prospect of doing well, instead of becoming apprentices to tailors and cobblers. The draft-money saving of £8 for each in premium—£176—repaid the cost, with something like a certainty of a prosperous future for the lads.

Stepney District School placed out 711 boys and 756 girls; and at the end of that time only ten females and three males were found to be dependent on the rates. Of boys placed out in the following seven years from the same school, only two were reported to be failures. But no child can be sent to a district school, or the ship *Goliath*, unless the parents or guardians consent. Now, a child's relatives (in this class) are often its worst enemies. When such children come to grief, it is usually through bad examples. Why should not guardians who clothe and educate be entrusted with parental power? Poor parents would rather, in many cases, have their children live on the rates than gain an honest livelihood for themselves. Band boys almost invariably soon become depauperized, and many become non-commissioned officers. Yet such cases as these occur. A well-trained boy musician in the North Surrey District School wished to join a regiment where several of his school-fellows were employed. His parents—bedridden tenants of a workhouse—remonstrated against his enlistment—wished him to remain in school at a cost of 6s. weekly, though able to earn his own living. Another boy (a good musician) was prevented enlisting by his father, a convict sentenced to seven years penal servitude.

And we have heard of guardians who supported what they called the conscientious scruples of pauper parents against the naval and military service. The most successful results are obtained where not only workshops for teaching trades are attached to schools, but where a farm or large garden supplements the workshops. These truths are becoming well known, and in a few years we hope to see the last vestige of pauperism extinguished in industrial schools attached to, but far away from, workhouses. The boarding-out system amongst really decent labouring people has good points over huge schools, but the details are difficult to work.

Thame Union boarded four children with a person who had been for some years schoolmistress at the workhouse. An inspector visited the house, and found all the four children, who had been sent there in perfect health, labouring under skin disease; that they slept in one bed, which was spotted with blood from their sores. On inquiry, it was found that the reliving officer did not know of their condition; and trusting in the woman's respectability, had neglected to visit the house. Additional security for children boarded out must be found; security against ill-usages is indispensable. Their education must be secured. The woman in this case had provided to educate the children at threepence per week per child.

THE PUBLIC HEALTH BILL.

Since we gave an analysis of the principal provisions of the Public Health Bill the Government have abandoned for the present the greater part of the measure, and intend this session on to proceed with the first part of the original Bill, which provides for the constitution of "sanitary authorities." It may be good policy first to provide the authorities, leaving the duties to be imposed on them to be settled by a subsequent measure; but the plan has its disadvantages, and will of itself excite strong opposition. As we have already said, the Bill will divide all England into urban and rural sanitary districts. The first are to consist of boroughs, improvement Act districts having no part of their area within borough or local government districts, and local government districts. With these it would appear at first that no difficulty would be experienced, but a series of provisoe enacts—1. That any of the above-mentioned districts, the whole of which is included in and forms part of another urban district of larger area, shall for sanitary purposes be deemed to be absorbed into and form part of the larger district; 2. That where a borough or improvement Act district is coincident in area with a local government district, the Council or Improvement Commissioners are to be the sanitary authority; and, 3. Where any part of an improvement Act district is situated within a borough or local government district, or any part of a local government district is situated within a borough, the Local Government Board may by Provisional Order constitute the remaining part of such district a separate urban district, and provide for its representation. The subdivision of districts which is contemplated in this proviso, and which, in the cases suggested—namely, towns of considerable magnitude—would be highly objectionable, may, however, be prevented by the operation of other portions of the Bill, which give the Local Government Board extensive powers to alter areas and unite districts. Thus by clause 20 it is proposed to enact that the Local Government Board may, by Provisional Order, dissolve any local government district, and may merge any such district into some other sanitary district or districts; or it may, by Provisional Order, declare any portion of a rural sanitary district immediately adjoining a local government district to be included in the last mentioned. In the case of a borough comprising within its area the whole of an improvement Act district, or having an area co-extensive with such district, the improvement Act district may be dissolved, and the powers of the commissioners transferred to the council of the borough. Special drainage districts may in a like manner be dissolved. There is in these provisions sufficient work laid out to occupy the Local Government Board for some years; but with the urban districts, and their immediate surroundings, we do not expect much difficulty will be experienced. It may be different with the rural districts. A rural union, the Bill says, means any union (poor law) which is not wholly coincident in area with an urban sanitary district, nor wholly included in an urban sanitary district. Of such unions the guardians are to be the sanitary authorities of the district. There are also to be port sanitary authorities, constituted by Provisional Order, of the Local Government Board, who may be any sanitary authority whose district, or part of whose district, forms part of or abuts upon any part of a port in England. In the case of one or two river ports, the selection may be a difficult business. The Corporation of London have applied to be the port authority in London, and no doubt Parliament will accept them. The Bill, it must be understood, is not permissive. These authorities are directly constituted, and the first meeting of such authorities is to be held within twenty-one days after the passing of the Act, or at such other time as may be directed by order of the Local Government Board. In all urban districts the Local Government Acts are to be deemed in force, and the authority is entrusted with the administration of all the sanitary Acts. In rural unions the sanitary authority is charged with the powers of the sewer authority under the Sewage Utilization Acts, and with the several powers exercisable under the Common Lodging-Houses Acts, the Diseases Prevention Act. Both urban and rural authorities are to appoint medical officers of health and inspectors of nuisances. Provisions are also made for the appointment of clerks and treasurers, with special arrangements for economy. Necessarily a considerable part of the Bill consists of provisions regulating and controlling the proceedings of the several authorities, and distributing the expenses, and these need not be referred to here. The Bill is certain to create considerable commotion, and we wait for the discussion of it this afternoon with much curiosity. The powers it will confer on the Local Government Board are very extensive. It transfers to that Board all the authority which, under various Acts for sanitary purposes has hitherto been exer-

cised by any Secretary of State, or by the Privy Council, or the President of the Board of Trade. It will give to the Local Government Board power by Provisional Order to repeal all local Acts relating to sanitary matters, excepting, of course, such as confer privileges on corporations, companies, undertakers, or individuals for their own pecuniary benefit. Naturally it confers extensive borrowing powers on the authorities which it constitutes. To sum up, the object of the present Bill is to constitute authorities all over the country, who are to be charged with the execution of the sanitary Acts, who are to appoint medical officers of health and inspectors of nuisances, and who are authorized to borrow money. The rest is to come hereafter. For the present we hear no more of the supply of gas by such authorities, or their purchase of gas undertakings and the like.

Circular to Gas Companies.

NATURALLY enough the position of gas affairs in the metropolis, in the possible absence of gas referees, is giving rise to much discussion; and, as some gross delusions are current, we may once again refer to the matter. There appear to be some who affect to believe that along with the referees all legal gas-testing comes to an end. Now we have said before that after the apparatus they have prescribed and certified has been installed, the referees have nothing whatever to do with the testing. Thenceforward the testing-place and the apparatus is under the control of the Corporation or the Board of Works, by whom the examiner for the place is appointed. The supply of standard solutions, and other chemicals, is no part of the business of the referees—is nowhere authorized by any Act of Parliament. The cost of these is an expense incurred by the examiner in the execution of his duties, and is distinctly to be borne by the local authority. This may appear to be a small matter, but it involves a good deal. The cost of the necessary chemicals to the local authorities would be very small; but their supply by the referees necessitates an "establishment," which makes the expense to the gas companies very considerable. It is absurd to suppose, and insulting to argue, that such chemists as the two superintending examiners in the metropolis are not to be trusted with the preparation of standard solutions (if they are necessary), and the purchase of a few chemicals. The system of supplying these articles, moreover, is bad, because it relieves the examiners from a part of their proper responsibilities, and it is well that it is so soon to come to an end. It is now for the local authorities to see that the duty of testing the gas imposed upon them is properly carried out by their officers. If it were further necessary to show that the referees have nothing to do with the testing, we need only mention that no Act of Parliament requires the examiners to communicate to the referees the results of their testings. These have, we believe, been sent to the referees by courtesy; but the acts only require them to be forwarded to the companies, the local authorities, and the chief gas examiner.

It is hardly necessary now, however, for us to show that the existence of referees is not essential to legal testing, for by the letter from the Board of Trade to the Metropolitan Board, which we publish in another column, it would appear that the former Board are about to appoint other referees. Considering the questions which the Act of 1868 made over to the referees to settle, all who reflected on the matter expected to see the appointment to these offices of a practical gas manufacturer of high reputation, and two other gentlemen distinguished by attainments in physics and chemistry. We shall not stop to inquire how far these expectations were satisfied. The case is somewhat different now. The burner and photometer and apparatus question generally is settled, not indeed to the complete satisfaction of every one, but for the present that part of the business may be left at rest. The pressing question to-day is one which "obviously can only be "satisfactorily settled by persons possessing the highest chemical "knowledge and experience." For this reason the scheme which it seems the Board of Trade is inclined to adopt is to include in the new appointments one, if not two chemists of high reputation. This is exactly what ought to have been done in the first instance, and if it had been done, the "sulphur" question would have been settled long ago. These chemists of high repute are at once thoroughly to investigate the question of sulphur impurity, and, that being solved, the referees are to subside into a nominal commission, to be called upon as their services are required, and to be paid according to the services rendered. There is no longer to be an establishment costing the gas companies directly, and the gas consumers indirectly, £3000 a year. This plan of the Board of Trade is one which must be generally approved. It guarantees to the companies that a question which is to them of the last importance shall be thoroughly investigated by competent authorities, and to the public that the matter shall be settled without delay.

We may stop here for a moment to mention that the present referees have now fixed the maximum amount of sulphur at works where lime can be freely used, such as Bow and Beckton, at *fifteen* grains, the maximum of 30 grains applying to gas from works where lime cannot be "freely" used. But is there really any insuperable objection to the free use of lime in any or all works? Must the removal of it of necessity be a nuisance? We cannot think so; and this is one question we would press on the attention of the new referees. If an universal limit of 15 grains were fixed upon, no one could be dissatisfied, for, of course, on most days the quantity would be much below this amount. To show how much success has been attained in sulphur purification with the free use of lime, we may quote the *monthly* averages of sulphur, which will not be found in the abstract of the chief examiner's report, to be found in another place. These are as follows:—

	April.	May.	June.
Beckton.			
Maximum	48·8 ..	38·2 ..	19·3
Average.	45·1 ..	27·7 ..	13·3
Bow.			
Maximum	20·2 ..	14·3 ..	10·6
Average.	12·5 ..	9·5 ..	4·5

The quantity 10·6 grains found in Bow gas, we may say, was a quite exceptional amount present on one day only. On no other day did the quantity exceed 6·3 grains. There is one remark to be made on this return, and that is, that the amount of sulphur obviously comes down as the make of gas diminishes. What inference is to be drawn from this fact we must leave others to decide. The proper proportion of purifying space and material to the make of gas is a matter requiring careful investigation, reports on the subject being strangely contradictory.

We have, perhaps, said enough on this matter, which is directly interesting to but a few of our readers, and may now leave it with the hope that the present referees will pursue no obstructive policy in their last moments. Even supposing—a violent supposition it may be—that the original appointments were rather political than scientific, gentlemen who hold their offices under statute from year to year have no reason to be astonished if they are displaced, and certainly ought not to begrudge their opponents a taste of the sweets of office. The new appointments will be looked forward to with the greatest interest, and the proceedings of the new referees jealously scanned, so it is important that the Board of Trade should use the nicest judgment in their selection. Fortunately there can be no difficulty in finding men whose attainments will command the confidence both of the public and the gas companies.

Since the foregoing was in type, we have received copies of further reports of the referees on sulphur purification at Bow and Beckton, dated June 3 and June 17. We have not space for them in our present issue, but they will be given in our next. In the first letter to the Board of Trade the referees state they "have "much pleasure in informing the Board of the results of sulphur "purification at Bow and Beckton since the report of the referees "was placed in the hands of the gas engineers of those works." They then quote the results which are above, continued to the end June. In the second letter they further congratulate themselves on the results, and remark that the returns from Bow "show an "absence of the fluctuations which so clearly indicated the "ignorance which prevailed as to the right mode of using "lime." And they afterwards add: "In fact, as already stated, "the referees process of using lime is capable of entirely "removing the sulphur in gas, and thereby attains the great object "which gas engineers and chemists have sought after in vain." This last sentence seems to have been too strong for the gas engineers, and Mr. Trewby, of Beckton, and Mr. Harris, of Bow, write, the former as follows:—"The main point of the referees "letter, and one personal to myself, is the credit taken by them for "an improved method of using lime purifiers at these works, which "they call *their* lime process. . . Without the smallest communica-"tion with any one, I, on Oct. 24 of last year, adopted the process, "the beneficial results of which were communicated by me to the "referees, and appear in the statistics published by them." Mr. Harris writes (*inter alia*) as follows:—"As to 'their new method "of using lime purifiers,' I am now working the same purifiers in "the same manner as I have done (with experimental exceptions) "ever since their erection in 1867; the full details of this working "have been asked for by the referees, and furnished by me from "time to time." Some obvious remarks suggest themselves on this correspondence, but we defer them until we give the letters and reports *in extenso* in our next.

To a certain extent under a cloud in the metropolis, the present gas referees have found an enthusiastic admirer on the other side of the Atlantic, to whose "unprejudiced and disinterested eyes" it appears that the referees are sacrificed to popular prejudices as represented by the Board of Trade. Our contemporary candidly

admits that his "means of information are not expanded," as may be guessed from his remarks on the Board of Trade, "whatever that may be." "All we know of it," he says, "is that its "chairman is Col. Hogg, and its principal gas regulator Mr. "Runtz—*Arcades ambo* it may be;" and so on, with some remarks much more to the purpose than our contemporary is aware of.

The metropolitan gas accounts for 1871 have been laid upon the table of the House of Commons and ordered to be printed, but they are not yet issued. We shall give our usual abstract of them in the earliest possible number.

Against the fact of a very general rise in the price of gas, we may place the announcement by the West Ham Gas Company of a reduction from 4s. to 3s. 9d. per 1000 feet. At this price the company will, by their Act of Parliament, be entitled to pay a 10 per cent. dividend, and we sincerely hope they will be able to earn it. The Corporation of Bradford have not assented to the proposal of their Gas Committee to raise the price of gas 4d. per 1000 feet. It has been decided that the price shall remain the same for the present. The Gas Committee of the Huddersfield Town Council have recommended an advance of 4d. per 1000 feet, but whether the council will assent remains to be seen. At Hawick the price has been advanced 5d., at Grantham and Deeping 10d. per 1000, and at Grimsby the price has been raised from 3s. 9d. to 4s. 6d. The King's Lynn Company have given notice that after the present quarter they will allow no discount to customers; at Beccles the price is raised to 6s., and at Halesworth to 5s. 10d. At Kingsbridge, in Devon, 10d. per 1000 has been added to the price. In Scotland the Elgin Gas Company, and the Cupar Angus Company have added 10d. per 1000 feet to their price.

The question has been put to us, what is to be done for companies who, tied down to a maximum price by statute, can make no profit with the advanced price of coal? We have no doubt that Parliament would fairly consider such cases, and if the advance in coal be maintained, as we believe it will, some united action might very properly be taken to obtain relief. But companies with a good reserve-fund would have very little chance of success until such fund had been drawn upon and exhausted.

In his last quarterly report, an abstract of which will be found in another place, the chief gas examiner for the metropolis expresses a general satisfaction with the results of purification at the works of the Chartered Company. The returns of illuminating power with all the companies are highly satisfactory. In a return relating to the gas supplied to the Houses of Parliament, just made by Mr. Ayrton, the following very unjust remark occurs:— ". . Since that period (1870) 23-candle gas has been supplied "to the Houses of Parliament, the company taking care not, as "formerly, to furnish gas having a considerably higher illumi- "nating power than that specified as the minimum in their con- "tract." Dr. Letheby's report shows that the cannel gas of the Chartered Company is on the average 3 candles over the stipulated illuminating power. But nobody can satisfy the First Commissioner of Works.

The scheme for the amalgamation of the Western wth the Chartered Company is of the ordinary nature of such documents, with which our readers are by this time pretty familiar. It provides for the complete absorption of the smaller into the larger undertaking, with all rights and liabilities, and will in general be fully approved, though there may be some shareholders in the Western who think that, with their rapidly improving district, that company had an excellent future standing alone. For our own part we are inclined to believe that the amalgamation will eventually be to the advantage of both parties to the scheme. In this instance no dividend is guaranteed. The shares in the Western Company are to be exchanged for ordinary A shares in the united company, and no doubt the part of the scheme which has excited some alarm in the minds of the Western shareholders is the clause in the part relating to the distribution of profits, which states that after providing for the dividends on the several classes of preference shares of the united company, the residue is to be applied in paying a dividend not exceeding 4 per cent. on ordinary A shares and the B shares. It is further provided, however, that the surplus, if any, after these payments are made is to be applicable in payment of a further dividend on ordinary A shares only. It may be reasonably anticipated that the surplus profits of the united undertaking will allow the payment of the maximum dividend on the ordinary A shares, in which case, it is true, the ordinary shareholders in the Chartered will be the greatest gainers. The capital of the Chartered Company, after this amalgamation, will amount to £4,150,000. The scheme is to come into operation on October 1 next. The revenue accounts of the amalgamating companies are to be made up to the 30th of June, and after all claims, including dividends, are discharged, the balance remaining is to be carried to the credit of the revenue account of the united company. In accordance with the usual arrangement, the directors of each company are to continue in office until the next meeting of the united company for the re-election of directors, but provision is made for the gradual reduction of the number until they shall not be more than twelve, nor fewer than nine. The maximum sum payable to directors for the first year after the commencement of the scheme is £10,000, which sum is to be gradually reduced till in the tenth and subsequent years the maximum allowance is to be £6000 per annum. Six directors may retire from the board, and receive a sum equal to the amount of fees received by him during three preceding years, on giving three months notice from the commencement of the scheme, and if more than six give notice of a wish to retire, six are to be selected by ballot. A special clause in the scheme allows the directors, subject to the consent of the shareholders of the united company and the Board of Trade, to nominate and appoint Mr. Barber, secretary to the Western Company, to be a director of the united company. The sections of The Gaslight and Coke Company's Act which provide for the retirement of officers on pensions are incorporated, and form part of this scheme. Mr. Pritchard, we understaud, will retire from the company.

From the speech of the chairman at the recent meeting of the Patent Gas Company, we gather that no English gas company proposes at present to adopt the Eveleigh system on any other than an experimental scale. It is, however, to be adopted in eight of the smaller towns in France, and in one town in Hungary, as well as at St. Petersburg. The prospects of the company abroad appear to be good, but it seems that pending the general adoption of the process in England, the company are disposed to deal liberally with foreign countries for the sale of the patent, in order to satisfy the very natural desire of the shareholders for dividends. At present, we are told, no statement of the cost of gas at Barnet can be given.

The proceedings before a committee of the House of Commons on the Cheltenham Gas Bill, which we publish to-day, will be found of considerable interest. The company were opposed by the Town Commissioners of Cheltenham, who sought, amongst other things, to have a clause inserted enabling them to purchase the works within five years from the passing of the Act. The clause was promptly rejected by the committee. For the most part the company succeeded in obtaining all they asked; but the maximum price chargeable was reduced to 4s., and the minimum illuminating power was raised to 15 candles, tested by the new London burner. Thirty grains of sulphur and five grains of ammonia in 100 feet were allowed.

Correspondence.

THE COLLECTION OF GAS ACCOUNTS.

SIR,—Your correspondent, F. N. G., may have had "a good many years experience in gas matters," and also in "the usual routine of book-keeping by day-book, journal, &c.," but I venture to think he lacks my experience as an owner and lessee of gas-works, or he would find that in the supply of gas it is not desirable "that the ordinary course of trading should be reversed," nor that "there is no real necessity for dunning—but to stop the supply."

I find from the experience of nearly a quarter of a century in the management of the business of gas supply in various towns, that the proprietors of gas-works should, in their "usual course of business," give every "consideration to their customers" if they wish to encourage and extend the use of gas, and that it is bad policy to "reverse the ordinary course of trading" by "disgracing" a consumer with "threats," as recommended by F. N. G., except as a *dernier ressort*.

The system of discounts I introduced some 20 years ago, and have found it not entirely free from objection.

If F. N. G. had to supervize the gas manufacturing and cash accounts of several towns as I do, he would not have abandoned the "tabulated method" in favour of "ledger, day-book, journal, &c."

July 4, 1872. R. H. JONES.

PATENT GAS.

SIR,—Mr. Mellor's paper on Dr. Eveleigh's process of gas manufacture, read at the meeting of the "British Association of Gas Managers," must have given that body much satisfaction, because it brought before them in the most reliable manner all the details of the process followed by that gentleman.

Mr. Mellor deserves hearty thanks for his paper as well as for the pains he took in answering the questions of the different speakers who criticized the process described by him.

Mr. Mellor calls the mode adopted by Dr. Eveleigh one process of manufacture, but, as rightly remarked by Mr. Clift, it is really two distinct processes. Now, if we take Mr. Mellor's figures as given in his paper, we find that the whole of the second process (or the tar distilling) adds no light-giving substance to the gas obtained in the first instance. True the bulk is increased from 8800 cubic feet to 11,000, but this 11,000 feet of 20-candle gas contains no more light than the 8800 feet of 25-candle gas. Now, sir, this fact naturally suggests the question, is this 2200 feet of non-light-giving substance worth the trouble and expense of the tar-distilling apparatus, together with, perhaps, a smart royalty?

Gas-Works, Coleraine, July 10, 1872. JOHN ROBINSON.

THE PRICE OF COKE.

SIR,—In the discussion, at the meeting of gas managers, on Mr. Jones's paper on the increased cost of coal, the suggestion that "there should be a combined action to raise the price of coke," is *erroneously* attributed to me. I did not speak on that subject, but had I done so I should not have made what I well know to be an impracticable suggestion.

I advocate the use of one uniform measure, such as that adopted many years ago by the companies on this side of the water, and still rigidly adhered to by me, every sack being filled from the measure, or "kettle," as the men call it—a cylindrical vessel 18 inches diameter and 2 feet 11 inches deep—about 5¼ of these measures going to a cubic yard.

My system is that adopted by my late father, viz.,—absolute cash payments and *no contracts whatever*, the price being the highest the laws of supply and demand permit me to obtain.

Your reporter has correctly given the remark made, but attached it to the wrong name. GEORGE LIVESEY.

South Metropolitan Gaslight and Coke Company,
589, Old Kent Road, E.C., July 3, 1872.

[On referring to his shorthand notes of the discussion, our reporter finds that the remark was made by J. G. Livesay (Ventnor), and not by our correspondent.—ED. J. G. L.]

A DEFENCE.

SIR,—The artificial pretence of reading a paper on the "Cheapest and Best Means of Abstracting Ammonia," at the last annual meeting of the Association of Gas Managers, afforded Mr. Anderson an opportunity not to be neglected of enviously attacking the metropolitan gas engineers, as reported in your last issue.

That such unjust charges should have been made is greatly to be regretted by all desirous of promoting harmony amongst professional men and maintaining the present high debative character of the association.

A more egotistical, arrogant, and opinionated paper it is difficult to conceive; but when the author of it digresses, for the purpose of attacking the professional reputation, to make charges of incompetency, in fact, against fellow-members of the association, his conduct is extraordinary in the extreme, and the chairman did well in remonstrating with the irrepressible author of the paper in question.

It is well known that for purity no gas in this country—probably in the world—excels, or in most cases equals, that supplied under the City of London Gas Act, 1868, which Act, it will be remembered, creates and maintains an efficient staff of chemists and "examiners," supplied with the most improved scientific apparatus to test continuously for impurities and uniformity of illuminating power. The severity of this Act is well understood by the companies under its stringent provisions; that the appointment, however, of these referees and examiners has wrought good and extended the general knowledge of purification and "sulphur compounds" by directing superior minds to the study of the subject, few will deny; or that each year has added something more towards the elucidation of the hitherto abtruse problem, now reduced (as Dr. Odling has shown) from speculative reasoning to known definite and practical rules. That the credit is due to the referees is an erroneous idea. The metropolitan gas engineers can justly claim the lion's share. But more remains to be done before chemically pure gas is supplied to the public. Whether attacks or papers similar to these under consideration will accelerate that desirable consummation is very questionable indeed.

Mr. Anderson was peculiarly unfortunate in his allusion to the "new works" with "40 grains of sulphur" (which, by the bye, I hear is now 6 or 7 per 100 feet). The talented designer of those magnificent works can well afford to despise Mr. A.'s critical uncharitableness. His well-earned reputation, his honourable and actively useful career, and his recent elevation to the directorate of the company he served so well, and the general esteem in which he is held, speaks all that is requisite, and renders further comment unnecessary.

The other able officers of the same and other companies under the referees are also well known for their scientific attainments and skilful management of the respective undertakings committed to their charge. No doubt they will continue to do their duty—not an easy or light one, but arduous, multifarious, and difficult. Unlike the would-be champion of Doveronian ideas, they cannot devote their time to the supererogatory work of the "eight labours of Hercules—instructing those ignorant sons of the soil, called the aristocracy! and their creatures!! into the benefit to be derived from ammonia applied to the soil." Neither do they claim any "priority of knowledge," or go into bombastic and ridiculously amusing ecstasy about the fanciful superiority of Scotchmen; but they generally manage to pay the statutory dividends notwithstanding, and also allow their fellowmen to dwell in peace, without public manifestations of animosity. Upon reflection, sir, I really claim too much for these gentlemen. How is possible for them to possess any knowledge of "GAS," seeing that Georgie Anderson has it *all?* and unless he condescends to enlighten the dark minds of the Londoners, including the "Ignorant Aristocracy and their creatures," whoever they are, I see no hope of redemption. But speaking seriously, Mr. Editor, the chemistry of gas lighting and the "mushroom notions of the day" are become so abstruse and persistently progressive, that, to use the old Johnsonian expression, slightly altered,

Panting Anderson toils after it in vain.

London, July 8, 1872. ONLY A COCKNEY.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JULY 1, 1872.

The RHYL IMPROVEMENT Bill was reported, without amendments.

The WARWICK LOCAL BOARD WATER Bill was read a third time, passed, and sent to the Commons.

The BURY IMPROVEMENT AND WATER, and the ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT Bill, were reported, specially with amendments.

The BRIGHTON CORPORATION WATER Bill was returned from the Commons, with the amendments agreed to.

TUESDAY, JULY 2.

The KEIGHLEY WATER Bill, and the HAWORTH LOCAL BOARD OF HEALTH Bill, were read a third time, with the amendments, passed, and sent to the Commons.

The POTTER'S BAR GAS Bill was recommitted to the same Select Committee.

THURSDAY, JULY 4.

The POTTER'S BAR GAS Bill was reported from the Select Committee, with amendments.

FRIDAY, JULY 5.

The WALLASEY IMPROVEMENT Bill was reported, with amendments.

The WARWICK LOCAL BOARD WATER Bill was returned from the Commons, with the amendments agreed to.

MONDAY, JULY 8.

The POTTER'S BAR GAS Bill, now the BARNET DISTRICT GAS AND WATER Bill, was read a third time, passed, and sent to the Commons.

TUESDAY, JULY 9.

The WALLASEY IMPROVEMENT Bill was read a third time, with the amendments, passed, and sent to the Commons.

The NOTTINGHAM AND LEEN DISTRICT SEWERAGE Bill was returned from the Commons, agreed to, with amendments. The said amendments considered, and agreed to.

The HAWORTH LOCAL BOARD OF HEALTH Bill, and the KEIGHLEY WATER Bill, were returned from the Commons, with the amendments agreed to.

THURSDAY, JULY 11.

The DARLINGTON IMPROVEMENT Bill was returned from the Commons, agreed to, with amendments. The said amendments were considered and agreed to.

HOUSE OF COMMONS.

WEDNESDAY, JULY 3, 1872.

The DARLINGTON IMPROVEMENT Bill, and the NOTTINGHAM AND LEEN DISTRICT SEWERAGE Bill, as amended, were considered.

THURSDAY, JULY 4.

A petition was presented against the MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill, from the Portsea Island Gas Company.

FRIDAY, JULY 5.

The WARWICK LOCAL BOARD WATER Bill.—The Lords amendments were agreed to.

MONDAY, JULY 8.

The HAWORTH LOCAL BOARD OF HEALTH Bill, and the KEIGHLEY WATER Bill.—The Lords amendments were agreed to.

The NOTTINGHAM AND LEEN DISTRICT SEWERAGE Bill was read a third time, and passed, with amendments.

METROPOLITAN GAS COMPANIES.

Mr. S. CAVE asked the President of the Board of Trade whether Her Majesty's Government contemplate the introduction of any measure for the purpose of extending the provisions of the City of London Gas Act of 1868 to other metropolitan gas companies.

Mr. CHICHESTER FORTESQUE: It is not at present the intention of the Government to introduce a measure for the compulsory extension of the provisions of the City of London Gas Company Act of 1868 to the other metropolitan gas companies. The provisions of that Act have, I believe, worked well, but other committees have, unfortunately, not thought it their duty to incorporate the provisions of that Act in the bills submitted to them. There is one important provision of the Act of 1868—namely, that which regulates the amalgamation of the companies. The Chartered Gas Company has already obtained powers under the Act of last year to amalgamate with other companies under the terms of the Act of 1868. Acting on this authority the Chartered Company recently submitted to the Board of Trade a scheme for amalgamation with the Western Company. Under this scheme the companies proposed to be amalgamated would become subject to the provisions of the City Gas Company Act of 1868.

GAS IN THE HOUSE OF COMMONS.

On the report of Supply,

Mr. POWELL complained of an increase in the use of gas in the House of Commons, particularly in the library, and expressed a hope that the First Commissioner of Works would do nothing in that way in future without consulting a committee of the House, which he had not done in the case referred to.

Mr. AYRTON said all he had done in the library was to bring the gas lower, so that an honourable member might now dispense with the use of a candle, which formerly was required in addition to the eight gaslights over his head. No doubt there was a certain prejudice against gas. There had been a prejudice against coal fires also at one time, and he had heard of a lady in London who had insisted on a divorce, on the ground that her husband practised the gross cruelty of burning a coal fire in the drawing-room.

Mr. L. BOOTH and Lord C. HAMILTON urged that the complaints deserved more serious attention than the right honourable gentleman had given them.

TUESDAY, JULY 9.

The DARLINGTON IMPROVEMENT Bill was read the third time. Verbal amendments made. Bill passed with amendments.

The BARNET DISTRICT GAS AND WATER (changed from Potter's Bar Gas Bill) was read a first time.

THURSDAY, JULY 11.

THE WATER SUPPLY IN BERMONDSEY.

Mr. KAY SHUTTLEWORTH asked the President of the Board of Trade whether he had directed any further inquiry to be held in consequence of the complaints made to him from Bermondsey that, although there was a temporary improvement in the supply of water after the former complaint and the inquiry to which it led, the supply had been again grauadlly decreasing in some parts of the district, and persons had again been going from house to house begging water. He said he hoped the House would permit him to state that since he [gave notice of this question he had received an epitome of 26

letters which had been addressed to the Bermondsey committee, all of which spoke of the continued dearth. Several of them gave details of the sufferings of their wives and children in consequence, and it was mentioned that they had even had recourse to horse troughs for water. It was also stated that the sewers, from not being flushed, emitted a most offensive smell.

Mr. CHICHESTER FORTESCUE: I can assure my honourable friend that there are no legal means in my power that I should not be most anxious to use for the purpose of remedying the evils which have arisen in this district and are arising from the imperfect powers of this company of supplying water. But I can only answer by stating the facts of the case—by showing that whatever could be done has been done. On the 5th instant some of the inhabitants of Bermondsey complained that there was still a dearth of water, but on the previous day the Board of Trade examiner had heard of the matter and had communicated with the Vauxhall Company, recommending them to put up stand-pipes in some of the streets. The engineer of the company acted at once on that recommendation and several stand-pipes were put up, and the effect of that was, these stand-pipes being in immediate connexion with the main-pipes, that if there was water in the main-pipes it would be procured. In that case, at all events, no blame is to be laid on the defective fittings in the houses in the district. If the water is not to be found in the stand-pipes the fault will entirely lie with the company. I may add that on the 6th instant there was a sufficient supply at Bermondsey.

HOUSE OF COMMONS.

TUESDAY, JULY 2.

(*Before Mr.* ASHETON CROSS, *Chairman; Mr.* CONOLLY, *Mr.* MACKINTOSH, *and Sir* WILLIAM WILMOT).

CHELTENHAM GAS BILL.

Mr. DENISON, Q.C., the Hon. GRANVILLE SOMERSET, Q.C., and Mr. FALLON appeared for the promoters; Mr. HORACE LLOYD, Q.C., and Mr. MICHAEL for the Improvement Commissioners.

Mr. SOMERSET said this was a bill to extend the Cheltenham Gaslight and Coke Company's limits of supply; to authorize them to make a short connecting railway or tramway between their works and the Midland Railway; to stop up Alstone Terrace Road and other purposes. The preamble recited that the Cheltenham Gas Act, 1856, repealed a previous local and personal Act (59 Geo. III., c. 17), and that by it the company continued incorporated, and were authorized to supply gas for public and private purposes within the parishes of Cheltenham, Leckhampton, Prestbury, Charlton Kings, and Swindon, and their capital was fixed at £75,000, of which amount £25,000 was capital stock, and the residue was share capital; and the company were authorized to borrow on mortgage or bond any sums not exceeding in the whole £17,500. It then recited that the company had raised by shares and stock £75,000, and by borrowing on mortgage, £13,000, and had expended these sums on their undertaking. It recited further that the population and number of houses in the parishes of Up Hatherley, Badgworth, Shurdington, and Staverton, which adjoined the parishes the company were now authorized to supply, had increased and were increasing, and it was expedient that the company's limits of supply should be extended thereto. It further recited that it was expedient the company should be authorized to make and maintain a short line of railway or tramway from the Midland Railway at Cheltenham to a point in the company's works, and on the south side of the public road known as the coach road. It then recited that the company's gasworks were at present divided from each other by the Alstone Terrace Road, the soil of which was, or was reputed to be, vested in the company, and which, though occasionally used by the public, had never been repaired by the representatives of the public, and most of the houses which formerly existed on both sides of the road had been pulled down, and the remaining houses were about to be pulled down, and that it was expedient that the company should be authorized to stop up the road. It finally recited that it was expedient the company should be empowered to raise more money for the purposes of their undertaking, and that the Act of 1856 should be in some respects amended. It would be necessary to take the committee briefly through the history of the company, and then to direct their attention to the petition—the only petition—against the bill, which was from the local authority of the town. In the year 1818, an association was formed to supply Cheltenham with gas, and in the following year an Act of Parliament was obtained to incorporate the company with power to raise £15,000 in £50 shares, and, if required, a further sum of £10,000 among the shareholders. By that Act no quality of gas was prescribed; there was no limit to the rate of dividend; no obligation imposed to supply either public or private consumers, nor was there any limit as to the prices to be charged, except that for the first three years the charge was not to exceed 11s. 6d. per 1000 cubic feet, Like all other undertakings of the same description, this company had to struggle with great difficulties at the onset. However, the works were erected and the town supplied. In the year 1856 the demand for gas in Cheltenham had increased so much that it was found necessary again to apply to Parliament, the whole £25,000 previously authorized having been expended. The Act obtained by the company in 1856 repealed the Act of 1819, and authorized the conversion of the £25,000 already raised into stock with a dividend of 10 per cent. It also authorized the raising of a further sum of £50,000, with a maximum dividend of 7½ per cent., and gave the company borrowing powers to the amount of £17,500, and extended their limits to the places named in the preamble of the present bill. The Gas-Works Clauses Act, 1847, was incorporated in that Act; the illuminating power of the gas to be supplied was fixed at 10 candles, with a maximum price of 4s. per 1000 cubic feet for the public lights, 5s. for private consumers in Cheltenham, and 6s. 6d. for those in the out-districts, with a deduction of 5 per cent. for prompt payment. In 1857 the number of consumers in Cheltenham was 1400, last year it was 3770. The quantity of gas consumed in 1857 was 45,000,000 cubic feet; last year it was 124,000,000. In 1857, in the out-districts already mentioned, there were only 21 consumers; in 1871 there were over 400. In 1857 the consumption in those districts was 324,000 cubic feet; in 1871 it was 8,800,000, so that within and without the town the increase was very considerable. In 1861 the population of Cheltenham was 39,690; in 1871 it had increased to 41,923, and the houses during the same period had increased from 7282 to 7845. The company had supplied gas, not according to the strict requirements of their Act, but in excess of those requirements, for they had supplied it of 13-candles' illuminating power, at the price of 3s. to the public lamps, 3s 9d. to private consumers, and 4s. 5d. in the out-districts, including the 5 per cent. deduction. During the period between 1856 and 1871 they had laid out the whole of the share capital they were authorized to raise, and £13,000 of borrowed money; they had, therefore, only £4500, which they could raise in order to carry on their works. From experience, they found that the increase in the demand for gas was at the rate of 10 per cent. per annum. This increase arose not only from the extension of the number of consumers, but also from the increased consumption per head, so that, even if the population had remained stationary, there would still be a considerable increase. The company had, therefore, no choice but to ask Parliament to allow them to increase their capital, seeing that it would be otherwise impossible to fulfil their duty to the town. Accordingly by this bill they sought power to raise an additional £100,000—*i.e.*, £80,000 as ordinary share capital, with a maximum dividend of 7 per cent., and £20,000 by way of loan upon mortgage. Their calculation was that this would enable them to go on for about 14 or 15 years meeting the requirements of the town. It was not usual to come to Parliament asking for a less amount of capital than would suffice for such a time, and it would be alike disadvantageous to the company and to the public. The position the company were in was this: they reached the maximum limit of their manufacturing power last winter; and, with reference to storeage power, with the highest day's consumption, 900,000 cubic feet, they had only gasholder room for 950,000 cubic feet, which was a most inadequate margin. Any casuality or extraordinary demand under such circumstances would find the company unprepared to do their duty, and therefore, in both these respects, they required additional capital. They estimated that the amount necessary to be expended immediately was £25,000, and that the whole of the £100,000 would be called for in the next few years. The present bill incorporated the provisions of the Gas-Works' Clauses Act, 1871, so that the company would be brought under all the restrictions and regulations of the most recent legislation on this subject. The only petition against the bill was that of the Cheltenham Improvement Commissioners. It appeared, however, from a report which he held in his hand, that a very small majority—if a majority at all—of the commissioners objected to the bill. The commissioners were a body consisting of 30 members, and on the 22nd of April last, after this bill had passed the House of Lords, they held a meeting to consider whether they should persevere in their opposition. There were 28 members present, and of these 14 voted for proceeding with the petition, 9 voted against it, 1 did not vote for reasons of his own, and 4 felt it their duty to abstain from voting because they were shareholders in the company.

The CHAIRMAN: Was that a public meeting?

Mr. SOMERSET said it was a meeting of the commissioners; there had been no public meeting. The petition, after alleging that the streets and public highways were vested in, and subject to the control of commissioners, stated that the commissioners were empowered to contract with any gas company for lighting the said streets. No doubt they had the power, and, as a matter of fact, had contracted with this company, and so satisfied were they with their contract, that though it had now expired, they continued the lighting on the same terms. Then they stated that they were empowered by their Act to erect gas-works and manufacture gas for the supply of the public lights, and to levy a rate for such a purpose, and for the purchase of any works they might require. He was quite aware they had this power, but he was at a loss to see how that affected the present case. Further on, they alleged that the allegations in the preamble of the bill were incapable of proof, and that the proposed extension of limits and interference with public property would be highly prejudicial to the borough of Cheltenham. With regard to the extension of limits to the places named in the preamble he might state that buildings in those directions from Cheltenham were going on, and that to a great extent, from year to year, they more and more required gas. The company, therefore, felt it to be their duty, in the public interest, to put themselves in a position to meet that requirement, and to be prepared to furnish a supply both for public and private purposes, when called upon to do so. As to the alleged interference with public property, he was at a loss to know what it meant. The petition then stated that the rights and powers sought in the bill were exclusively for the benefit of the company. It was not so; the company were compelled to furnish a supply of gas, and if they did not do so they were liable to penalties. Referring to the allegations in the preamble, the petition went on to state that the company had not legally acquired their property on the south-west of Alstone Terrace Road. To that statement he first of all gave a denial—the company had legally acquired the property; secondly, if they had not, the commissioners should have interfered to prevent its acquisition; and, thirdly, this was not the place to try a question of title. Such a point could not be discussed in the committee, and it had nothing to do with this case. The petition stated that there was nothing obligatory upon the company to supply gas within the extended limits. Of course there was not; but if they did lay their mains in them, any person residing within twenty-five yards could compel them to furnish him with a supply. Then it was stated that the parishes in question were so sparsely populated that the supply of gas to them would be unprofitable, and that any increase of the capital for the purpose was inexpedient. The meaning of this was, that if the company spent money in supplying these out districts, they would not be able to reduce the price of gas in Cheltenham. This was a matter of evidence which he would not now go into. The petition then complained that the company took powers to construct a tramway or railway, and in connexion therewith to cross a certain public road on the level, which the commissioners objected to. The company obtained their supply of coals by water up to Gloucester, and thence by railway to Cheltenham, and they had to cart them from the railway to their works. They also obtained a portion of their coal from Staffordshire, and the cartage cost them something like 1s. per ton. It was important if they could do so to cheapen this matter, and the Midland Railway Company did not object to the proposed tramway. In the House of Lords this tramway was objected to by two persons, who had market gardens across which it would pass. Lord Redesdale also objected, and the House of Lords gave the company permissive power only to take land for the purpose of the tramway; but, there being no power in the commissioners to authorize the crossing of the public road, the Lords gave compulsory powers to the company for that purpose. If this committee also gave them permissive powers there would not be the least difficulty in making arrangements with the parties, and therefore this was all the company asked, it being provided by a clause that no locomotive engine should be used upon or across the road. The petition stated that such a power was contrary to precedent; but in truth it could be shown that there were plenty of precedents for it. Then it stated, "Your petitioners submit that if the company are empowered to cross the road on the level, your petitioners should have power to use the same in conjunction with any other tramway, &c." To that the company replied that they would give the commissioners every possible facility, but they could not bind the Midland Railway to acquiesce in such an arrangement. The petition then complained of the proposed stopping up of Alstone Terrace Road as a great injury to them and to the inhabitants of the town. This road was originally made for the convenience of certain cottages, but all the cottages and land there had been from time to time bought up by the gas company, and the whole now belonged to them, and they believed that the soil of the road was vested in them. This road had never been taken to by the commissioners, and they had never spent one farthing upon it.

The CHAIRMAN: But the public have a right of way?

Mr. SOMERSET said they had, because it had been open so many years; but it was rarely used, and it did not appear that the public would be in any way injured by its stoppage. The commissioners alleged that it was an important highway and was vested in them, but as he had already said they had never taken to it and had never laid out any money upon it. The petition asserted that the company had not reduced the price of gas as they ought to have done under their existing Act; but on this point the company successfully resisted them in the House of Lords. Then they said that the new capital should be offered to the public by auction, but the company could see no reason why they should deviate from the usual course, which was that the shareholders should have the choice of taking up the new capital either in whole or in part. The petition then asked that the company should be placed under recent legislation. He could not understand what more they required, the company having incorporated the Gas-Works Clauses Act of last year in their bill. The commissioners stated that they ought to be enabled to purchase the undertaking of the company, but this power, according to their contention, they

already had. They further stated that the price of gas at Cheltenham was unnecessarily high, and that the illuminating power and quality and pressure were not so good as they ought to be. This was matter of evidence, and, therefore, he should make no comment upon it. But, in passing, he might remind the committee of the different state of things existing at the present moment, with regard to coal and labour, to that which existed even so recently as the time when the bill was before the House of Lords. Before the committee of that House the promoters proved that coal had recently risen 3s. to 4s. per ton, but since then the price had nearly doubled; the increase was now nearly 8s. per ton, and seemed likely to be permanently maintained at that rise. The question of the price of coal, independently of labour, affected the cost of gas at the present time to the extent of something like 9d. per 1000 cubic feet. There were other allegations in the petition to the effect that the bill, as it now stood, altered and repealed certain important provisions of the Company's Act of 1856, to the prejudice of the commissioners, and contained clauses giving the company arbitrary powers in regard to the laying of services, &c., which ought not to be sanctioned. He confessed that he could not discover the ground for those allegations, and must wait to see how they were supported by evidence. Meanwhile he thought he had said sufficient to show the necessity for extending the capital and powers of the company, and to justify them in asking the committee to pass the preamble of their bill.

W. N. Skillicorne, Esq., examined by Mr. SOMERSET.

I am a justice of the peace, deputy-lieutenant of the county of Gloucester, and chairman of the Cheltenham sessional district of the bench of magistrates. I have been for 14 years a director, and for 12 years chairman of the gas company, and am very well acquainted with their history and arrangements. (Witness deposed to the facts as to capital arrangements, referred to in the opening speech.) It was absolutely necessary that we should come to Parliament with this bill. We took the advice of our own manager, and also that of Mr. Hawksley, and the result has convinced us that what we now ask for is requisite, if we are to do our work in the interests of the public.

Mr. LLOYD said perhaps it would shorten the inquiry if he were to explain, on behalf of the commissioners, to what part of the bill he objected on principle, and to what parts he objected as to details, so that the evidence of the promoters might be directed to them. There were parts of the bill to which he did not object. He could quite understand and appreciate the application of the company to Parliament for more capital, though it was a question how much they ought to be allowed to raise. But there were portions of the preamble which stood apart from the rest, to which he should object on principle, and his objections would fall under three heads, with a rider to one of them. In the first place he objected to the power sought to stop up the highway—Alstone Terrace Road. Secondly, he objected to the company having power to construct the railway or tramway for their own private purposes only, and to cross a road vested in and managed by the Improvement Commissioners. If the tramway were not to be a private one, this objection would not be so strong. Thirdly, he objected that there was no occasion for and no call on public policy to extend the mains of the company into the new localities mentioned in the preamble. His objections on these three points were based on broad principles. Now the question whether or not the company were to extend their limits involved the question, not whether they should have any more capital at all, but how much new capital they should be authorized to raise for the improvement of the supply in their old district. There were some further points he should raise. Assuming the company to be right in coming to Parliament to put themselves under fresh legislation, the question was, what the quality of their gas in future should be, at what price it should be supplied, what tests it should be subject to, what security the public should have over their accounts, and also how the new shares should be disposed of.

The CHAIRMAN: That is a matter of clauses.

Mr. LLOYD said it occurred to him that it would be better to go through these questions on preamble, and then, assuming the preamble to be proved, he would submit clauses.

The CHAIRMAN: Do you object to that, Mr. Somerset?

Mr. SOMERSET: You give us our preamble, then?

The CHAIRMAN: The shortest plan would be to call evidence with regard to the three points mentioned.

Mr. LLOYD: If the preamble were passed there would be a statement that certain things were proved.

The CHAIRMAN: Then you had better prove your preamble on the points objected to.

Examination continued: We are advised by our engineers that the new capital now asked for will enable us to go on for another 12 or 14 years. The consumption of gas is increasing, both in Cheltenham and the out-districts, and we feel it to be our duty to be prepared to meet the demand. It is a very expensive process getting our coals from the railway into the gas-works; it costs us 1s. per ton. In the House of Lords we were granted permissive power over the land for the purpose of constructing the tramway, and compulsory power to cross the road. I know Alstone Terrace Road. I have never seen many persons passing along it; indeed it is almost impassable. It has never been taken to by the commissioners, nor have they ever spent a shilling upon it. Old rubbish has been at times thrown upon it by the gas company. The road was originally made for the accommodation of the cottages which have since been bought by the company, and I believe the soil of the road is now vested in us. It will be a great convenience to us to have the road stopped up. At present we manufacture our gas on one side of the road, and store it on the other. The two portions of our works are connected by a tunnel under the road. I believe the stopping of the road would be no inconvenience to the public. The allegation in the petition respecting our "proposed interference with public property," means that we propose to cross the coach road with our tram. I do not know of any other public property interfered with. We shall not cross that road with a locomotive. As to the allegation that we have not legally acquired the land on the south-west side of the Alstone Terrace Road, we purchased that land some years ago. We have never manufactured gas upon it; only stored it. The commissioners never interfered with us for so doing, and, until we were in the House of Lords, I never heard the question raised.

The CHAIRMAN: We are not going to try a question of title here.

Examination continued: With respect to the out-districts, all we want is that if houses are extended into those parishes we may have power to supply them. With reference to the use of the tramway by the commissioners, we have no objection. We are bound by our agreement with the Midland Railway as to carrying traffic on it, but subject to that we are quite ready to give the commissioners facilities on proper terms. We believe we have fulfilled all our obligations under the Act of 1856, and as to subjecting ourselves to modern legislation now, we have the Act of 1871 in our present bill. I am not aware of any important provisions of the Act of 1856, which this bill repeals.

Cross-examined by Mr. LLOYD: This bill assimilates the charge for the public lighting to that of the private consumers. We had, by the Act of 1856, power to acquire more land than we previously possessed. Since that date we have bought land which was not scheduled in that Act, and paid for it out of capital. I think we had a right to do so. If we had not bought it, we should not have been owners on both sides of Alstone Terrace Road. We only manufacture gas on the land scheduled in our Act; on the other side we simply store gas. We desire to absorb the road because of the inconvenience of having our works cut in two by it. The present subway which connects them is very inconvenient. We have not had the actual traffic on the road tested. The persons who own land beyond are perfectly willing it should be stopped. I am aware that there is a power in the General Highways Act to get a road stopped up if necessary, but I believe that Act is not applicable to places where there is a local Act. We have not taken any steps under that Act for the purpose. The coach road we propose to cross with a tram is vested in the commissioners, and we are willing to afford them the right to use the tram, as far as we are concerned.

The CHAIRMAN: I understand the question stands in this way: You are perfectly willing the commissioners should have every facility over the tramway, but you cannot bind the Midland Company.

Mr. LLOYD: Is not your difficulty this: That you have agreed with the Midland Company that no one shall use the tramway without their consent?

Witness: It is so.

Mr. LLOYD: And did you not make that agreement after you knew we wanted it for public purposes?

Witness: The railway company would not consent to our going on their line without we made such an agreement with them.

Cross-examination continued: The out-districts which we were authorized by the Act of 1856 to supply were Swindon, Charlton Kings, Prestbury and Leckhampton. We have done nothing under that Act at Swindon, which is a low part, where houses are so few that it would not answer our purpose to put down a main. At Charlton Kings——

The CHAIRMAN: How do these inquiries arise on your petition, Mr. Lloyd?

Mr. LLOYD: I am going to show that the introduction of gas into the limits of the Act of 1856 was so slow and so unproductive, that we are justified in objecting to further expenditure in that direction. It goes to the question whether at this distance from Cheltenham there is a great call for gas.

The CHAIRMAN: That must depend upon circumstances.

Mr. SOMERSET: I asked the witness whether he could give any details as to the business, and he said he could not.

Cross-examination continued: We are paying our full dividends, and have done so for some years past. Our reserve-fund is made up. We have paid no arrears of dividends. We have no surplus profits beyond what is enough to carry on the works with. There was an excess of profit at June, 1871, after paying the full dividend of £1659. That is employed as floating capital. There is not an unaccounted-for balance of £3602 besides. I believe no portion of our surplus revenue has ever gone to purposes of capital in extending works. I have not myself gone into the accounts to see whether the reserve-fund does no more than account for the balance of profits. The reserve-fund is invested in Consols. We have about 120 shareholders in all. The new capital we ask for will be allotted amongst them. The effect of creating that capital will not be to prevent a reduction in the price of gas, because the assumption is that as the demand for gas increases so will the profits, and they will pay the interest on the additional money invested. We shall not extend our works into new districts unless there is a prospect of its being remunerative. The conduct of the company in the past is a security that they will not expend money unprofitably in the future. The extensions to Charlton Kings and Prestbury now pay us. I do not think the capital we ask for in this bill depends upon whether we are to go into new districts. I am told we should require to double our capital even without them. There is no great manufacture in Cheltenham which consumes gas, but the population increases very fast.

Re-examined by Mr. SOMERSET: Whether we extend our limits or not we must have a large additional capital. Our last contract for coals was at 14s. per ton; we have just made a fresh contract for 5000 tons at 21s. 6d. and 5000 tons at 20s. 8d.

Mr. *Robert O. Paterson*, examined by Mr. FALLON.

I am the manager of the Cheltenham Gas-Works. I succeeded to that post on the death of Mr. Esson, two years ago. The number of houses has increased and is constantly increasing in the town. In 1861, the number was 7282, and in 1871, 7845. With this increase going on it is necessary the gas company should have more capital. During the next two years we must expend £25,000 in increasing our works. Our present storage is not sufficient. It amounts to 950,000 cubic feet, and our largest day's consumption last winter was 900,000 cubic feet. We have 69 miles of mains, of which 65 are in Cheltenham alone. Some of our small mains require to be taken up and replaced by larger. There are 23 miles of 2-inch main that will shortly have to be relaid, as they are too small for the requirements of the district. We cannot estimate the cost of that at less than £500 per mile. In Cheltenham the price of gas is 4s. and 3s. 9d. gross, subject to the statutory deduction of 5 per cent., which makes it 3s. 9d. and 3s. 6d. per 1000 cubic feet. The public lamps are supplied very much lower—viz., at 3s. 1d. per 1000, net. In the out-districts we charge 4s. 5d. net. Our maximum price is 5s. for private and 4s. for public consumption in Cheltenham, and in the out-districts 6s. 6d. By the present bill it is proposed to fix the maximum at 4s. 6d. in the town and 5s. in the out-districts. The public lamps are lighted under contract with the commissioners; the columns and lanterns are the property of the gas company, who charge for lighting, extinguishing, cleaning, and repairing them 14s. each per annum. We lose about 3s. 6d. per lamp by that arrangement, which amounts to £240 a year. The minimum illuminating power proposed in the present bill is 14 candles, as tested by Sugg's London Argand burner. The proposed pressure is 7-10ths, which I believe is ample for all purposes.

Cross-examined by Mr. MICHAEL: We find the consumption of gas generally doubles itself in ten years. In 1869 our total rental was £25,244, in 1870 it was £27,183, and in 1871 it was £28,613. I have not taken out the per centage. Last year the surplus profit was £1659. The reserve-fund only became full last year. It has been from time to time invested as the money was set aside.

Mr. MICHAEL asked for the production of the company's books, and said his object was to show that the company were in such a position that they ought to reduce the price of gas.

Cross-examination continued: The dividends on the investment have been added to the reserve-fund from time to time. We have had notice to produce our books.

Mr. MICHAEL: According to our accounts the reservefund should have been full in 1867. As I understand, your storeage is 950,000 cubic feet. What is the relation which storeage ought to bear to the greatest daily supply in mid-winter?

Witness: In Cheltenham we find we cannot carry on our works at all safely, or even economically, without a storeage in excess of the maximum consumption.

Mr. MICHAEL: What is the usual rule observed by gas companies with respect to the greatest supply in mid-winter and the storeage?

Witness: In many companies the storeage is in excess; in other companies a little under. But no company working under its maximum storeage feels itself safe.

The CHAIRMAN: But what ought to be the storeage?

Witness: I say that it should be in excess; perhaps 25 per cent.

Mr. MICHAEL: Do you say it is the usual rule that the storeage should be in excess of the greatest daily supply?

Witness: No. I do not know that there is any general rule.

Mr. MICHAEL: Is it not accepted as a general rule that two-thirds of storeage power is adequate?

Witness: I think not. I know in Cheltenham it requires to be in excess.

Mr. MICHAEL: What are the circumstances in Cheltenham which take it out of the usual rule?

Witness: It is purely a residential place, and there is a heavy demand for gas in the early part of the evening, which runs the gasholders down very rapidly.

Cross-examination continued: We are at the present time deficient in storeage, and sometimes our carbonizing apparatus has to stand idle because of this deficiency. Another reason why we require more is, that we have adopted the eight-hour shifts. Our leakage, and unaccounted-for gas, and gas consumed on the works, amounts to about 14 per cent. Our total make of gas in 1871 was 150,000,000 cubic feet; the total quantity sold in Cheltenham, 121,000,000, and in the out-parishes 8,500,000. We propose to erect, as soon as possible, a new gasholder, 136 feet in diameter, double lift, each 22 feet, capacity 690,000 cubic feet. The estimated cost is £15,000. There will also be an outlay required of £3000 on manufacturing apparatus for extension of power. Our works were originally erected in 1819, and have been added to from time to time since. We could manufacture more gas on the same ground if we had more retorts. The £3000 would be solely for new apparatus. There would be about 200 retorts, the production of which would be about 3000 cubic feet each per diem. In 1869 we expended on repairs of works £1661, in 1870 £3234, and in 1871 £3948. The reason of the greater expenditure in the last two years is that for some time before Mr. Esson's death he was incapacitated, and after his death considerable repairs, which had been postponed, had to be carried out. I do not think there has been more expended on the average than is usual in gas-works. Even if we are confined to our present limits of supply it will soon be necessary to take up the 23 miles of small mains. I know that our mains in the outlying districts do pay us 7½ per cent. upon the outlay. The company are not likely to extend their mains into the proposed new districts, unless it would be remunerative. I do not know the number of houses likely to take gas at Shurdington. I do not know the number of houses there rated above £20. I have not made any estimate of the expenditure necessary for supplying these places. The cost would be about £500 per mile of main, but I do not know how many miles would be wanted. We require at the works increased condensing power, and increased scrubbing power, and, as the consumption increases, we must have more engine and boiler power. Then our mains are being extended daily in our present district; fresh applications for gas are continually coming in. To meet this increasing consumption, without any regard to extensions, we shall require £25,000. The consumption of gas at Charlton last year was 2,687,300 cubic feet. There are 5½ miles of mains in that parish. I cannot tell the outlay there, but I do not think it would amount to £500 per mile. In Prestbury the consumption was 1,862,100 cubic feet: the length of main is 3¼ miles. There are lamp-posts erected there at our expense, but the lamps are not lighted. We went there at the request of the parish, and put up our lamps, but after having lighted them for a limited period, they withdrew from the arrangement. I have no doubt that in a short time we shall be called upon to supply them again. At Leckhampton the consumption was 5,151,438 cubic feet, and the length of main is five miles. At Swindon we have no mains; we have not been requested by the inhabitants to supply them. Under our present Act there is a reduction of 20 per cent. to the commissioners of Cheltenham for all the gas supplied to the public lamps. We did not propose to alter that matter when we went to the House of Lords, but the committee of that House altered it, and now it stands that they are to be charged at the lowest rate charged to private consumers. Ordinarily there is a great difference between the largest and the smallest consumers. There are some large consumers at Cheltenham. I cannot tell the amount paid by the largest. I do not know that it is £100 a year. The commissioners pay between £4000 and £5000 a year. I am not able to give any information as to the purchase of the land in Alstone Terrace Road. We obtained for the old gasholders we sold £150.

Mr. *James Paterson*, examined by Mr. FALLON.

I am engineer of the Warrington Gas-Works, and father of the last witness. I know the Cheltenham works, and visited them a few months ago. I have examined the accounts of money expended in repairs of those works. Taking the average of fifteen years, it amounts to 4s. 7½d. per ton of coal carbonized. I consider that very reasonable. I know the Alston Terrace Road; it would be very desirable for the company to be able stop it up.

Mr. *William Brown*, a former resident in Alstone Terrace Road; Mr. *W. Radcliffe*, a contractor; and Mr. *John Neal*, a builder, were examined as to the bad state of that road, and the smallness of the traffic upon it.

Mr. *John Muckleworth*, examined by Mr. SOMERSET.

I was the highway inspector for the town of Cheltenham for many years, and know that the Alstone Terrace Road was very little used. I now live at Staverton, and I produce a requisition from the inhabitants there.

Mr. MICHAEL objected to this evidence.

Mr. SOMERSET: Who is it addressed to?

Witness: The gas company.

Mr. SOMERSET: Then I will have it read.

Mr. MICHAEL: What is the date of it?

Witness: March, 1872. I obtained the signatures to it myself. I then gave it to the clerk of the gas company.

Mr. MICHAEL: Where did you get it from now?

Witness: From the clerk.

Mr. MICHAEL: You cannot use it, for, even assuming the requisition is good evidence, it does not come out of proper custody.

The CHAIRMAN: Let us have the clerk.

Mr. *F. T. Griffiths*, examined by Mr. SOMERSET.

I am the clerk of the company. I hold in my hands a requisition from owners and occupiers of property at Staverton. It is addressed to the company. I received that document from the last witness about a fortnight ago, and it has been in my custody since. I gave it to him to-day.

Cross-examined by Mr. MICHAEL: When I read it, I put it in my box. It has not been presented to the gas company at a public meeting.

The CHAIRMAN: This is a matter which has no weight on my mind.

Mr. SOMERSET: The point raised in the petition is that these people do not want gas.

The CHAIRMAN: I always rule in cases of this kind that if you want to prove people want gas, you should bring two or three of them here to say so.

Mr. SOMERSET: This gentleman is an inhabitant of Staverton.

Witness: I am; and I should like to have gas. I have resided at Staverton three years. My neighbours are of the same opinion. It is not an increasing place.

By Mr. MICHAEL: I am way-warden. I do not know the number of houses in the parish. The length of our high road is 2¼ miles. I think it is more than 2 miles from our church to the nearest main of the company. I do not know that there are only two houses in the parish rated above £20, and that there are only 60 houses in the parish altogether. The building part of Cheltenham is increasing in that direction.

Mr. *W. Lawrence*, examined by Mr. SOMERSET.

I live at Badgworth, and want gas badly; so do my neighbours.

Cross-examined by Mr. MICHAEL: I cannot answer the question as to the number of statute acres in the parish, nor whether there are 50 houses rated above £20, and a total number of 257 of all rents. The increase has been three houses a year for ten years. We have a church in the parish, which is about 2 miles from the nearest main of the gas company.

Mr. *W. Margetts*, examined by Mr. SOMERSET.

I live at Shurdington, and want gas badly. I was present in the House of Lords to give evidence on this bill, but was not called.

Cross-examined by Mr. MICHAEL: The nearest main of the gas company is about a mile from us. Cheltenham is extending very fast towards our parish. The increase in the population has been nearly three persons per annum in ten years. There are less than 200 inhabitants at the present time.

Mr. J. T. Darby, examined by Mr. SOMERSET.

I am an architect and surveyor in Cheltenham, and a member of the Board of Improvement Commissioners. I voted against the petition. I am not a shareholder in the gas company. I have known Cheltenham all my life. It is an increasing town. In 1861, the population was 35,693; in 1871, it was 41,923. In 1861, the number of houses was 7282, and in 1871 it was 7845. The increase in population in the 10 years, therefore, was 6 per cent., and in houses about 8 per cent. In Leckhampton, the population in 1861 was 2523, and in 1871, 3260. In Prestbury, in 1861, the population was 1297, and in 1871, 1372. In Charlton Kings, the population in 1861 was 3443, and in 1871, 3680. In Swindon, the population in 1861 was 227, and in 1871, 239. With reference to the proposed new limits, the population of Up Hatherley in 1871 was 50, and the number of houses 19. In Badgworth, the population in 1871 was 1157, number of houses 266. In Shurdington, the population in 1871 was 197, number of houses 46. In Staverton the population in 1871 was 299, and the number of houses 74. The nearest main to Badgworth parish is 1200 yards distant; to Shurdington, 1600 yards; to Staverton, 1½ mile, and to Up Hatherley, 1200 yards. Building in Cheltenham is extending in these directions. There will not be an immediate call for gas, but there certainly will be in a few years. I know the Alstone Terrace Road. It would not be an inconvenience to the public if it were closed. I know that a piece of ground adjoining has been offered to the commissioners as a stoneyard, but they have come to no decision upon it.

Cross-examined by Mr. LLOYD: It is an open question, whether it would be a desirable thing for the commissioners to take that land. I do not know whether it depends upon the fate of this bill. Our special committee reported that, if Alstone Terrace Road was shut up, it would be no use for the commissioners to take it, but there has been no decision of the board upon the subject.

Re-examined by Mr. SOMERSET: Cheltenham did not increase so much in the last ten years as in the previous ten years. Public lamps are only put up on the requirement of the commissioners.

WEDNESDAY, JULY 3.

Mr. *R. O. Paterson* recalled, and further cross-examined by Mr. MICHAEL.

The amount expended by the company in supplying the present out-districts was as follows:—Leckhampton—expended for mains, services, columns, and street-lamps, £1092 15s. 11d.; Charlton Kings—for street-mains, private services, columns, and lamps, £1442 12s. 3d.; Prestbury—street-mains, services, columns, and lamps, £808 8s. 11d. Nothing has been expended in the other parishes.

Mr. MICHAEL: Give me the cost of gas per 1000 feet to the consumer's meter.

Witness: Somewhere over 3s.

Mr. MICHAEL: And what at the station-meter?

Witness: I believe about 2s. 0½d.

Mr. MICHAEL: How much do you say at the consumer's meter?

Witness: 3s. 0½d.

Mr. MICHAEL: Then how much do you reckon for unaccounted-for gas?

Witness: Last year I made it about 14 per cent.

Mr. MICHAEL: 14 per cent. upon 2s. will not come to 3s.

Witness: When I gave you the price at the consumer's meter, I included dividend, interest on loans, rates and taxes.

Mr. MICHAEL: I must ask you to extract these items.

Witness: I gave 2s. into the gasholder—I beg pardon, it is 2s. 0½d. at the consumer's meter.

Mr. MICHAEL: Now, at the gasholder?

Witness: Into the gasholder, with all expenses, 3s. 0½d.—that, includes dividend, interest on loan, and other charges.

Mr. MICHAEL: Surely it cannot cost you more into your gasholder than it costs into the consumer's meter?

Witness: Our cost into the gasholder is 21½d. nearly.

Mr. MICHAEL: And 2s. 0½d. into the consumer's meter?

Witness: Yes.

Mr. MICHAEL: Total expenses to pay dividend and interest?

Witness: 3s. 0½d.

Mr. MICHAEL: Actual price realized?

Witness: I have not got it on my notes; but it is 3s. 8d.

Mr. MICHAEL: Do you not, as engineer, in order to inform your board of directors, make out an abstract of the cost per 1000 feet into the station-meter?

Witness: I do.

Mr. MICHAEL: Let me have that for the last half year.

Witness: I have given 1s. 9½d. into the gasholder, 2s. 0½d. into the consumer's meter, and 3s. 0½d. with all expenses.

Mr. MICHAEL: And what does it realize per 1000 feet?

Witness: It was 3s. 8½d., as near as possible.

Mr. MICHAEL: Does that include the public lights?

Witness: It includes everything.

Mr. MICHAEL: You have looked over the books; tell me how the reserve-fund is made up.

Witness: In the first year of our investment (1861) we invested £1997 5s. 7d.

Mr. MICHAEL: I see, at the end of 1859, you had a surplus of £360 13s. 7d., and at the end of 1861, £1137 3s. 5d.

Witness: I believe there was a surplus in those years.

Mr. MICHAEL: Can you explain to me how it was these sums were not invested as a reserve-fund?

Witness: We kept our balance a little above the requirements for dividend, and it stands at current expenses account.

Mr. MICHAEL: You made a current expenses account of surplus profits?

Witness: I do not call it so.

Mr. MICHAEL: But you kept it in hand and used it for your own purposes, instead of transferring it to reserve-fund?

Witness: Quite so.

Mr. MICHAEL: You have given me now the first year. How much did you put by the next year?

Witness: In 1864 we put by £499 5s. 10d.

The CHAIRMAN: Nothing in 1863?

Witness: No.

Mr. MICHAEL: I call attention to the fact that there were £3000 odd surplus profits in those two years. At the end of 1863 there was £1992 19s. 9d.

Witness: Yes.

Mr. MICHAEL: Those two sums are not put to the reserve-fund?

Witness: No. In 1864 we put by £499 5s. 10d.

Mr. MICHAEL: But in reality you made a surplus profit of £595 3s. 2d.

Witness: Yes; we had a surplus.

Mr. MICHAEL: Therefore, in addition to the £3000 odd there was £100 more this year. What was the amount of interest you added to the reserve-fund that year?

Witness: In 1864 we invested £107 4s. 5d. of the dividends from the investments.

Mr. MICHAEL: According to law, you are obliged, when you have invested money as a reserve-fund, to add the interest to the principal every year?

Witness: That we have done every half year.

Mr. MICHAEL: When did you put any surplus profits again to the reserve-fund?

Witness: In 1865, £798 17s. 9d.

Mr. MICHAEL: Where does that come from? It does not appear in your published accounts.

Witness: I do not think any of the reserve-fund appears in the published accounts. It appears in the amount of the balance.

Mr. MICHAEL: Can you show me how you made up that amount in 1865, and why it should not be £1700 as well as £700?

Witness: Our accounts show that we invested this £798 17s. 9d. It is in the balance here, but not as a separate amount. In 1866 we invested £499 5s. 5d. In 1865 we invested £244 19s. 3d. of interest received on investment. In 1867 we invested £499 6s. 10d.; in 1868 we made no investment; in 1869 we invested £499 6s. 9d.; in 1870, £997 7s. 2d.; and in 1871, £500 13s.

Mr. MICHAEL: In the last year you had £1659 16s. 9d. surplus profit after paying dividend in that year?

Witness: Yes.

Mr. MICHAEL: Adding up the total of the sums given, what is the amount of the reserve-fund?

Witness: Money invested, £6291 2s. 7d.; dividends invested, £1208 17s. 5d.; total, £7500.

Mr. MICHAEL: You cannot add anything more to the reserve-fund?

Witness: No.

Mr. MICHAEL: The balance is to go in reduction of the price of gas. What is the annual sum accruing as interest from the money invested?

Witness: We have only had one half year's interest at present—£111.

Mr. MICHAEL: That makes £222 per annum to go in reduction of price.

Witness: We have a surplus of £2070 8s. on current expenses.

Mr. MICHAEL: That ought also to go in reduction of price.

Witness: That sum is now lying to meet the expenses of obtaining this Act of Parliament

Mr. MICHAEL: Of course, as an engineer, you know that the public are entitled to any sum that remains after paying full dividends and making up the reserve-fund?

Witness: Yes.

Mr. MICHAEL: Then, if these sums would make any reduction in the price, they could enforce, under the Act of 1847, such a reduction, and you cannot apply it to paying the expenses of an Act of Parliament?

Witness: It is usual to keep a sum of money in hand.

Re-examined by Mr. SOMERSET: The 136 million feet said to be sold in 1871 included the gas consumed on the works which is not paid for; the amount actually sold was 129 millions. I divided the expenditure in that year by the 136 millions, which makes the price lower; when I said the cost was 3s. 0½d. it was dividing by the 136; if I had divided by the 129 it would have been more.

Thomas Hawksley, Esq., examined by Mr. SOMERSET.

I have been acquainted with the Cheltenham Gas-Works for many years. My opinion as to the proposed extension of the company's limits, is, that the places named in the preamble ought decidedly to be included, for although some parts of them do not require lighting at the present moment, they will certainly do so within the period over which this bill is supposed to last. Buildings are observably extending in the direction of those parishes, and though they are not thickly populated now, they will become so in the next 10 or 12 years, and inasmuch as by their existing powers the pipes of the company may be extended to the boundary of Cheltenham parish, there is no reason, so far as my experience tells me, why they should not be extended a little further to light these places. It is quite customary to make this provision when companies are coming to Parliament for an increase of capital. It will be 12 or 15 years before this company will require to come to Parliament again. There is no good in their coming earlier. Parliament is tired of these inquiries, and is trying to get rid of them. Formerly the period was 20 or 25 years, but latterly we have taken a shorter time. According to the rate of increase in Cheltenham the whole of the capital now asked for will be expended in the period named. The consumption increases at the rate of 7 per cent. per annum; therefore, in ten years hence, as in the past ten years, the magnitude of these works will be doubled, and the £100,000 now asked for will be exhausted. The distances of the new districts given in evidence yesterday were taken from the ends of the existing mains, and not from the boundary of Cheltenham, to which the company have now power to go. For the purpose of ascertaining the additional cost of supplying these places it would be proper to take the distance from the extremity of their present limits, to which, according to my view, they ought now to be carried. To light the whole of these districts would require about four miles of mains; and from £2000 to £2500 would be the whole of the expenditure necessary for supplying the populated or likely to be populated portions. This sum would not require to be expended for several years to come.

Mr. SOMERSET: With regard to making the railway or tramway, you have considered this matter?

Witness: I have had a great deal of experience in making sidings to gas-works, and I have never known a single instance in which a railway company have permitted other persons to make use of those sidings. It is dangerous to do so. There must be signals and pointsmen, and it is very undesirable to let any persons than those for whom the siding is made, use it. In the case of Bath, a clause was introduced by the railway company to prohibit its use by other parties than the gas company, and that was a case on all fours with the present, even to the stopping up of a road. It would be an advantage to the gas company to have this tramway; it would save them perhaps 3d. per ton on the conveyance of their coals. I have been at the works for several hours at a time, and never saw any one pass along Alstone Terrace Road. The advantage of stopping it up is that it would give the gas company free communication between the two parts of their works, and there would be a piece of ground gained for the storeage of coal or coke, and, inasmuch as the company have to erect an additional gasholder, it would be very convenient to utilize a portion of the ground for that purpose.

Cross-examined by Mr MICHAEL: It would take nearly a mile of main to supply Badgworth. I have not made any calculation as to the number of houses there which would be likely to take gas. It would be a 3-inch pipe, and would cost perhaps £300. I do not know the size of the existing main on the road to Badgworth.

Mr. PATERSON: Three inches.

Witness: I should not recommend the extension of a 3-inch main. If the company had looked forward to doing this immediately, no doubt they would have laid a larger pipe; this would probably last two or three years; but unquestionably there must be an enlargement of the pipe ultimately. At Up Hatherley, I think no main would be required for a considerable length of time, but it is necessary to include that place because it surrounds Badgworth. The higher rate of charge for gas in the outlying districts will abundantly repay the cost of laying the mains there. The differential rate of 6d. per 1000 cubic feet is more than enough for the purpose. The length of main required for Shurdington is about 1¼ mile. I have made no calculation as to what quantity of gas will be consumed in these districts at the end of ten years. Probably it will not exceed 5 million feet per annum. The cost of adapting the works for that additional manufacture would be about £3000. If the population continues to increase only at the slow rate at which it has increased in the last ten years, the consumption of gas in Cheltenham will be doubled. We know it as a practical fact, that in the manufacturing districts the consumption uniformly doubles itself once in seven years; and in places like Cheltenham it has four times over, since I have been engineer, doubled itself once in eight years; and at Cheltenham itself it has done so once in 10 years, which is at the rate of 7 per cent. per annum. There are three things contributing to this—there is, first, the increase in the population; next there is the increase of the quantity consumed per unit of population; and, thirdly, there is the introduction of gas into a greater number of houses year by year. The best part of Cheltenham is not at present wholly supplied, but there are pipes through all the streets. The sale of gas last year was 129 million cubic feet, which is at the rate of 18 cubic feet per head per diem upon the existing population, which is a very large consumption indeed, even compared with manufacturing towns. Notwithstanding the adverse times, the American war, and the great commercial crisis, which materially affected the prosperity of watering places, Cheltenham has gone on steadily increasing in its consumption of gas 7 per cent. per annum for the last 10 years, and also for the 10 preceding years.

Mr. MICHAEL: Is there no limit to such an increase in a place where the population only increases 5 per cent. per annum?

The CHAIRMAN: It is evident there must be a limit.

Witness: The limit is not reached, and there is no appearance of the increase ceasing for many years to come.

Mr. MICHAEL: What is the ratio which the storeage should bear to the greatest supply?

Witness: It was three quarters of the greatest day's consumption, but it ought now to be one day's consumption, because in consequence of the state of the labour market, and the unruly character of the workmen, we cannot depend upon getting the requisite quantity of gas made day by day with the regularity we formerly did, consequently everywhere I am advising a larger amount of storeage. The present storeage at Cheltenham is 950,000 cubic feet. It will cost £28,000 to increase that 600,000, with all the necessary works. I have put down for a gasholder £11,000. I think it was 60 retorts. The retorts and buildings and everything connected with them, will cost about £160 per retort, without purifying apparatus. Then there is the cost of the railway, which, with compensations, will probably come to £5000, and lastly, the expenses of this Act. There will also have to be a gradual extension of the mains in three or four years, and the cost of new meters, with additional money required to carry on the undertaking for purchasing coal. Altogether my estimate is that £28,000 will be wanted.

Re-examined by Mr. SOMERSET: There are nearly 8000 houses in Cheltenham, and about 4000 of them take gas.

The CHAIRMAN: I think you should ask one general question for the committee about the expense of the whole works.

Mr. SOMERSET: Do you think, turning your attention to this portion of the preamble, that an increase in the capital of £100,000 is an absolute necessity?

Witness: It is; not absolutely necessary immediately, but it soon will be required to meet the demand which doubles itself in ten years.

This was the case for the promoters.

Mr. LLOYD said, so far as passing the preamble of the bill was concerned, he rather invited the committee than otherwise to do so, speaking on behalf of the Cheltenham Improvement Commission, because he wished the gas company, which had not been to Parliament since 1856, to be placed under the restrictions and regulations of modern legislation. It was, in truth, only from the necessity of coming to Parliament from time to time that gas companies were kept under proper control, the policy of the Legislature being not to pass general measures applying to all companies at once, but to pass a measure to which all new companies should be subjected from the outset, and which should be imposed upon existing companies when they came asking for fresh powers. It was, therefore, of great importance in this view of the case that Parliament should not give gas companies at one time powers so large and extensive as that they would remain free from any additional supervision for an indefinite number of years. With this view it was desirable that the capital of the company should be only so far increased as to meet the reasonable requirements for a limited period, so that they might again be obliged to come before Parliament, have their proceedings overhauled, and be subjected to such further regulations as might then be deemed prudent. But there were parts of this bill which stood quite distinct from that question, which were separated in the preamble, and which the commissioners objected to wholly on principle in the interest of the inhabitants. He was desirous that these parts should be kept distinct, so that in discussing them it should not be supposed he was opposing that which in the interests of the company might be reasonable and proper. The preamble of a local Act of this kind was presumed to show that there was some advantage to the public at large in the proposed legislation, and it was not usual for promoters to come forward as Mr. Skillicorne had done, and admit that the only object here sought was the advantage of the gas company. Here was a proposal to absorb in their interests so many square yards of ground without a shilling compensation, and to compel those who were in the habit of using this ground as a highway to go round in some other direction. The highest they could put it in the way of apology was that no one seemed to have an interest in the matter, that no one practically objected to it. But it must be borne in mind that not one single individual of those who did not object had been called. Under the Act of 1856 the company acquired the ground on one side of Alstone Terrace Road. Since then (whether out of capital or revenue did not appear) they had purchased the ground on the other side. It was clear they had no authority to do anything of the sort.

The CHAIRMAN: They greatly benefited the inhabitants of Cheltenham by doing it.

Mr. LLOYD: No doubt; but when gas companies desired to do something which they had no legal powers to do, they should go to Parliament. He did not object, in one sense, to their acquisition of the land; he only objected to the mode in which it was done, and that they assumed a power they did not possess. A corporate body, under Act of Parliament, had no power to purchase other land than that which their Act authorized them to acquire. Railway companies, it was true, had power within certain limits to acquire land not scheduled in their Acts, but a gas company had no such power. In the present case, by doing that which was illegal, the company possessed themselves of the land on both sides of the road, pulled down the cottages, and created the state of things they now relied upon, and then came to Parliament, urging that, being the owners of property on both sides of the road, the soil had become vested in them; a proposition which he was prepared to deny, because, under their special Act, the soil of all the highways was vested in the commissioners. He was not going to labour this point, but he submitted that the company had not made out any case at all. If it were true, as alleged, that this was a useless highway, in which no one was concerned, they could easily get powers to shut it up under the provisions of the General Highways Act. They dared not adopt proceedings of that kind, in which they would have to face the local authorities; but they hoped, in the bill which they were now promoting, this proposal might pass by unnoticed. But he submitted that they were not in a better position than if they had come to Parliament for nothing else. The people who used this road felt very strongly about the proposal to close it against them, and the people whose property lay beyond it would thereby be prevented from properly laying it out.

The CHAIRMAN: There is no petition from any one of the landowners.

Mr. SOMERSET: On the contrary, we have their signatures.

Mr. LLOYD said those landowners had a right to be heard in the House of Lords, because compulsory powers were sought by the bill as introduced; but those powers were now replaced by permissive powers. Then, as to the tramway—the public had some kind of interest in that. Ought the public road to be crossed on the level simply for the benefit of the company?

The CHAIRMAN: It will be ultimately for the benefit of the public in the reduction of price.

Mr. LLOYD: If they choose to reduce.

The CHAIRMAN: They are bound to reduce.

Mr. LLOYD: Only when they have taken their full dividends. Hitherto, even under those circumstances, they had not reduced the price. The Improvement Commissioners thought they were asking what was fair when they proposed that, if the tramway were made, it should serve for public purposes also. They did not ask that private individuals might use it, but they said if it could be taken advantage of for obtaining a supply of materials for repairing roads, &c., they should be at liberty so to use it.

The CHAIRMAN: That is to say, if you double the inconvenience of crossing the road it would be an advantage to the public. You say you have no objection to the tramway being put down if you are allowed to use it, but if you are to use it the inconvenience to the public by the stoppage of the road will be doubled.

Mr. LLOYD: It is not that I have no objection.

The CHAIRMAN: But if you can get the user of the railway you withdraw your objection.

Mr. LLOYD said if the commissioners could gain for the public such a benefit, they considered that, weighing one thing against the other, it would be better for them the railway should be there. They did not admit that for the sake of putting 3d. per ton into the pockets of the gas company this would be a sufficient justification; they only said that if it could be made also to serve a public purpose, the two things together would make a good cause for its construction. What he complained of was, that the gas company, knowing that this was a perfectly fair case on the part of the commissioners, perfectly well knowing that they were likely to have a depôt there, had gone and bought off the opposition of the Midland Company to their bill by promising that no one should use the tramway but themselves. But, even taking it so, they would not be breaking their agreement, if the committee, against their wish, put in the powers which the commissioners now sought. All the gas company could do was they could not give consent; they admitted that the proposition was reasonable, but they said their hands were tied.

The CHAIRMAN: Can we force the Midland Company to accept the condition?

Mr. LLOYD said he apprehended the Midland Company were in precisely the same position as the owners of the land passed through. If the railway was once made all the commissioners asked was permission to use it, paying a fair toll for the same. Turning to the question of the out-districts, he said the point which pressed upon the commissioners was this: The gas company had got to a certain stage; they had called up their capital, and were paying the full dividend upon it, and their reserve-fund was full—everything beyond that in the way of profit they were bound immediately to apply in reducing the price of gas. But if these out-districts were given to them, they could invent an excuse for calling up new capital, which would be divided among themselves; and thus the surplus profits, which otherwise must have been used to diminish the price of gas, would go to pay dividends on extra and unproductive capital. The company had no longer any interest in saving, when any additional profits they made the public came in to receive the benefit of. On the contrary, the company had a direct interest in taking powers to increase their capital. The commissioners objected on two grounds. In the first place, they submitted that the effect of this was to defer the time when the public could call upon the company to reduce the price of gas; and, secondly, because it gave them a long tether, and enabled them to wait for many years before they came again to Parliament. He thought it could be shown that the difference in the profit on the supply of the thickly-populated parts of Cheltenham and the out-districts was very broad indeed. In Cheltenham proper there were 55 miles of mains, which were the carriers and suppliers of 121 million feet of gas per annum; whereas on the outside there were 14 miles of mains, through which only 8¼ million feet of gas were supplied annually—*i. e.*, 600,000 feet per mile, or not much more than a fourth of what was supplied in the former case. If the company were only supplying gas to Cheltenham, they must at once reduce the price very much; but because they were supplying beyond the town, the profits made there were brought down; and if the committee gave them a still wider district, the effect would be still further to reduce the profits. And what were the new limits proposed? Who had proved that the inhabitants desired to have gas? These parishes contained very scattered populations, and where was the pressing necessity for the company to go into them? At the present moment their mains were three-quarters of a mile in some cases, and in others a mile, within the limits they were already authorized to supply; and it was clear, from the size of the mains which had been laid down, they did not contemplate at the time going beyond. The whole of this new move had originated in the fertile brains of the chairman and engineer of the company, who had invented the scheme as an excuse for the expenditure of fresh capital. And after all there was nothing in the bill to compel the company to go into these new districts; in fact, they were only used as a mere stalking-horse and an apology to keep them from coming to Parliament again for many years to come.

Mr. *D. J. Humphrey*, examined by Mr. MICHAEL.

I am the borough surveyor of Cheltenham, and have been in practice in the town as an architect and surveyor more than 20 years, and know the neighbourhood well. Alstone Terrace Road has been open to the public as long as I recollect. It is laid down in the oldest map I know of (1820) as a public road. The gradients taking the entire length of 350 feet are 1 in 35, but the western end is steeper than the other part. The steepest gradient is 1 in 20. On the western side of the coach road there are 24 houses, one of which belongs to the gas company. The gross annual value of the whole is £174 per annum. The road is used by the public; it is the shortest route from the Knapp to the Tewkesbury Road. Building is not rapidly increasing there. It would be of the greatest importance to the commissioners to acquire the use of the siding for their materials. There are between 60 and 70 miles of streets in Cheltenham. The mains of the company are laid down in the principal streets, and gas is pretty generally taken by the inhabitants of the largest houses and shops. The proposed extended limits of the company are very sparsely populated. They do not differ greatly from Swindon. Generally they are at a lower level, which would necessitate an increased amount of pressure.

The CHAIRMAN: There was no cross-examination as to that point.

Cross-examined by Mr. SOMERSET: I am not a gas engineer, and never had anything to do with gas-works. Mr. Wilson (one of the owners of land beyond Alstone Terrace Road) said he did not wish the road stopped up, but his opposition has been bought off. The land, pink on the plan, was offered to the commissioners a year ago as a depôt for stores and carts. (Witness was asked several questions as to the route of traffic to that spot; to show that the stopping of the road would not prejudice the commissioners in that respect.) Alstone Terrace Road was never formally taken over by the commissioners.

Re-examined by Mr. MICHAEL: It is not necessary it should be; all the highways are vested in them.

By the CHAIRMAN: I cannot say of my own knowledge that the owners of cottages in that road were ever called upon to repair it.

Mr. G. W. Sadler, examined by Mr. MICHAEL.

I am inspector of highways in Cheltenham. I have had the traffic taken on five occasions in Alstone Terrace Road. On Thursday, the 18th of April last, 590 persons and no vehicles passed along it; on Tuesday, the 30th of April, 585 persons and 18 vehicles; Sunday, the 5th of May, 612 persons and no vehicles; Saturday, the 18th of May, 481 persons and 13 vehicles; Monday, the 10th of June, 601 persons and 5 vehicles.

The CHAIRMAN: Have you any returns for last year?

Witness: I have not.

Cross-examined by Mr. SOMERSET: I had been there before more than half-a-dozen times in my life. These numbers were not taken by me personally, but by two men in the employ of the commissioners. There is nothing at all in the suggestion that more persons passed along the road on these occasions than usual.

One of the men employed to take the numbers was called and examined as to the accuracy of the return, and Mr. John Gibbon, a very old inhabitant of the district, proved that the road in question was formerly repaired by the surveyor of the hamlet of Alstone, and was taken over by the Cheltenham Commissioners when they obtained their increased powers.

G. W. Stevenson, Esq., examined by Mr. MICHAEL.

I am a gas engineer. I am acquainted with the district lighted by this company and also with the outlying districts included in this bill. Looking at the population of those places and the number of houses they contain, it would not, in my opinion, pay to light them with gas at all; certainly not from Cheltenham. If lighted it would be better to be done by independent works in each. The small main now laid in the direction of these places would have to be enlarged to give a supply from Cheltenham. There would be considerable loss by condensation and Cheltenham would have to pay that loss.

This was the case for the commissioners. On Mr. Somerset rising to address the committee,

The CHAIRMAN: said I do not think we need trouble you, Mr. Somerset. We are of opinion the preamble is proved.

The clauses were then proceeded with.

On clause 2—"Incorporation of General Acts"—

Mr. MICHAEL said the Gas-Works Clauses Act, 1871, which was one of the Acts incorporated, was rather peculiar. It contained a number of clauses in which blanks were left, to be filled up in the special Act incorporating it. He wished to strike out clause 11 of that Act, which provided that undertakers should furnish a sufficient supply of gas to owners and occupiers within the limit of the special Act, except so much of it as related to everything but pressure. He would afterwards submit a clause on that point.

The CHAIRMAN: Why should you make an exception as to clause 11?

Mr. MICHAEL: Under the 48th clause of the existing Act, 1856, no burden is entailed upon the consumers under this clause, but, by the General Act of last year, they are obliged to enter into a contract and find security, if required, before they can obtain a supply. We ask to be remitted to the former condition of things.

Mr. SOMERSET: This an attempt to upset the "modern legislation" of which they have been talking. The Act of last year was very carefully considered, and duties were imposed on gas companies under certain penalties. I am surprised at my friend's proposal. He has been saying, "Let us have modern legislation." Well, we have the latest general Act incorporated, and because one little matter in that Act seems to be against him, he seeks to have it excepted.

The CHAIRMAN: What words do you propose to insert?

Mr. MICHAEL: "Except so much of clause 11 as relates to everything but pressure."

The CHAIRMAN: We rule against you there.

Mr. MICHAEL: The next is a very important sub-section of the same clause. We say that we ought not to be called upon to enter into a contract for two years before we can get a supply of gas, or to give security for the payment of the gas-rent. I think the framers of this clause only intended this provision to apply to persons who, for the first time, take gas.

Mr. SOMERSET: Perhaps my friend will point out how this arises on his petition.

Mr. MICHAEL: In the 35th section we specially raise the point. We say "that the said bill, as it now stands, alters and repeals important provisions of the company's Act of 1856 for the benefit of the petitioners and the public generally, and contains arbitrary clauses with respect to laying down service-pipes and supplying gas."

Mr. SOMERSET: It has been laid down over and over again that there must be special allegations.

The CHAIRMAN: I think this is sufficient.

Mr. MICHAEL said the provision requiring a contract to be entered into to take the gas for at least two years would press very heavily upon persons who took up their abode in Cheltenham for three or six months. With respect to giving security, he asked that that also should be excluded; and, at the proper time, he would bring up a clause on the subject, providing that the moneys so deposited with the company should bear interest.

The CHAIRMAN: Why should this be excluded in your case? In 1871 Parliament thought this was a proper provision to insert.

Mr. MICHAEL: This clause is only put in as a general basis, to be altered or amended in the special Act.

The CHAIRMAN: I am quite aware of that; but what is there in Cheltenham which should induce us to adopt your suggestion?

Mr. MICHAEL: I venture to say that no Act of Parliament has recently been passed without a provision for the payment of interest on the security.

The CHAIRMAN: Has there been any since the Gas-Works Clauses Act of last year was passed?

Mr. MICHAEL: Yes; the Provisional Orders Confirmation Acts, 1872, which provide that where any money is deposited with the undertakers as security, interest at the rate of 5 per cent. shall be paid on every sum of 10s. for every six months it remains in their hands. I venture to say that provision has been inserted in every order by the Board of Trade, and is a general clause in every gas Act.

The CHAIRMAN: You might have a clause afterwards to say that on money deposited interest shall be payable. At present we are going to rule that the provision of the Gas-Works Clauses Act, 1871, shall remain as it is.

The clause was then agreed to. On clause 4,

Mr. MICHAEL asked to insert the following words:—"Nothing in this Act shall authorize the conversion of borrowed money into capital."

After some conversation on the point, the consideration of the clause was postponed.

On clause 5, relating to the price of gas,

Mr. LLOYD said he would appeal to his learned friends on the other side to assent to the alteration. The Lords committee intended to insert 4s. as the maximum in Cheltenham; but the chairman, in giving their decision, said 4s. 6d., and they would not then alter it.

Mr. SOMERSET said it must be borne in mind that the cost of coal had very much increased since then.

The CHAIRMAN: I think we ought to know, as a matter of fact, if the Lords made a mistake, what it was.

Mr. LLOYD: Lord Methuen, the chairman, said: "It appears that, owing

to some mistake, the real decision of the committee was 4s. instead of 4s. 6d.; but as 4s. 6d. was stated, they must abide by it."

Mr. SOMERSET: They gave us 4s. 6d. inside and 5s. 6d. outside. His lordship said: "We have given you 4s. 6d., and we abide by that; but we think it should be 5s. on the outside." Take it as much against us as you like on that statement.

Mr. *Hawksley* recalled, and examined by Mr. SOMERSET.

The 4s. 6d. maximum in Cheltenham will barely pay the company at the present price of coal. The price of coal has risen 1s. per 1000 feet upon the price of gas since March, and the greater portion of it since the middle of May. The company will get about twopence of that shilling back again in the value of coke. It would therefore be fair to reckon the increased cost of gas at 10d. per 1000 feet, exclusive of the great advance in the rate of wages. I may inform the committee of the fact that the average advance in the price of gas-coal all over the kingdom is 8s. per ton, and it is still rising. It has risen 3s. 6d. within the last month. The company are now charging 3s. 9d. for gas; the additional cost would make it up to 4s. 7d., but they only ask a 4s. 6d. maximum. I ought to mention here that the company have some surplus income, but nothing like the amount which by mistake was exhibited on the paper Mr. Paterson spoke to. The divisor in that case was considerably in error; and besides that, nothing was included for depreciation.

Cross-examined by Mr. LLOYD: I state this expressly, because there was an obvious mistake in the figures. If you divide the cost by the actual quantity of gas sold (129 millions) you will find it comes to considerably more than 3s. per 1000.

Mr. LLOYD: Is the "considerably more" 2d. more?

Witness: No. There is a sum of £776 divided by 136 millions, and that is said to be the cost of repairs which brings out 1-$\frac{368}{1000}$d. Now, there is no gas-work that, over a long period of years, can be maintained for less than 5d. The arithmetical error here has been dividing by 136 millions instead of by 129 millions; and Mr. Paterson has taken the expenditure of a particular year instead of an average of years.

The CHAIRMAN: How many years should you take?

Witness: In a case of this kind, where they are working in Scotch ovens, I should go over a period of 7 years.

Mr. LLOYD (after some examination of the accounts): Mr. Paterson puts in a figure which comes out to 3s. You have pointed out an arithmetical error which makes it 3s. 2d.

The CHAIRMAN: Without wasting the time of the committee, could not this be done behind the bar. (To witness:) What do you put down for depreciation?

Witness: One per cent., which in this case would be about £900 a year as nearly as possible; and this, divided by 129 millions, comes to a little over 1½d. We know that 1 per cent. will maintain the works permanently.

Mr. LLOYD: You know the works are kept up out of annual expenditure, and that they are as good at the end of the year as at the beginning.

Witness: No, they are not; there is always depreciation going on.

Mr. LLOYD: Do you take it as an axiom, that whatever exceptional circumstances there may be, gas companies are always to pay their maximum, and have no risk at all?

Witness: That is the contemplation of Parliament.

Mr. LLOYD: So you think?

Witness: I am certain. Parliament provides for it specifically in the Gas-Works' Clauses Act.

Mr. LLOYD: That a company is always, under all circumstances, to pay its maximum dividend?

Witness: If it can do it within the limits imposed by Parliament.

Mr. LLOYD: So that, however unexpectedly coal may run up, you shall always have enough profits to pay the maximum dividend?

Witness: Yes, *communibus annis.*

Mr. LLOYD: But this is not *communibus annis.*

Witness: The Gas-Works Clauses Act enables us to pay the full dividend, and to make up back dividends.

Mr. LLOYD: But you are asking a maximum dividend, which, under all circumstances, in that year you shall have.

The CHAIRMAN: I do not understand Mr. Hawksley to mean that?

Witness: I am giving evidence of the increased cost of coal and labour. I believe that increased cost is as nearly as may be a permanent thing. I have no doubt there will be fluctuations, but there is a steady advance, and it will be brought back to the same point.

Mr. LLOYD: And you are asking that all this may fall upon the consumer?

Witness: If the consumer made his own gas it would fall upon him, and he has no right to be placed in a better position if he gets it from a company than if he made it himself.

Mr. LLOYD: But if the cost goes down again, they get the advantage?

Witness: No; the same Act provides that the price shall go down.

Mr. LLOYD: After they get their maximum dividend?

Witness: But what is the maximum? Not what they can make out of their operations, but that which Parliament has thought fit to place it at.

Mr. LLOYD: Which is 7 per cent.—which is considered so valuable that your shares are at a premium?

Witness: And why not? If a person goes into a speculation of this kind, not unattended with risk, he is entitled to a higher rate.

Mr. LLOYD: You spoke of coke as a residual product, but there is also tar and ammoniacal liquor; these have all gone up.

Witness: They have, and they are advancing now. They went up long ago, and the benefit of that advance is shown in the receipts of the company for the past year.

Re-examined by Mr. SOMERSET: The object of the reserve-fund is to equalize dividend, if occasion requires.

The CHAIRMAN (to Mr. Lloyd): Have you any evidence to call upon the point?

Mr. LLOYD: I have evidence to show that 4s. is a proper price.

The CHAIRMAN: That is upon the calculation you have given.

Mr. LLOYD: Upon their own published statements.

Mr. *G. W. Stevenson,* examined by Mr. LLOYD.

I have been furnished with the printed reports of the company for the years 1857 to 1871. It is perfectly monstrous to take an average of years to ascertain what the present price of gas should be. We ought to take the last year, supposing the consumption has been regularly progressing.

The CHAIRMAN: Why should you not take an average? In ascertaining your own profits, do you take a single year?

Witness: That is not a parallel case.

Mr. LLOYD: I want to see whether it can be fairly said that the expenditure last year was less than it would be *communibus annis.* Was it an exceptional case?

Witness: The repairs last year were heavier than the year before, and I think the manager has fairly stated why that was.

Mr. LLOYD: What I want to ascertain is this: Looking over the accounts from 1857, are you fairly able to say that you may draw your conclusions from the last year, and that it will give you fair results?

Witness: Yes.

Mr. LLOYD: What do the results of last year show?

Witness: The results show that £5476 were expended in repairs, which is actually about 9s. per ton of coal carbonized. That 9s. pays the whole of the working expenses, management, wear and tear, and repairs of many gas-works in the kingdom, and therefore it is monstrously excessive. It is 7d. per 1000 feet in excess of what it ought to be.

Mr. LLOYD: I want to know on the total expenditure of the year, including dividends, at what price charged for gas would they clear all their expenses and pay dividends.

Witness: 3s. 1d. would pay all their expenses and dividends.

Mr. LLOYD: You say that last year, if their maximum had been 3s. 1d., they would have paid all their expenses and full dividends?

Witness: Yes.

Mr. LLOYD: Now do you think that having regard to any exceptional circumstances which may sometimes happen, 4s. is a fair maximum for them to take?

Witness: I think it is much too high. I think 3s. 6d. is very ample.

The CHAIRMAN: Is that the usual maximum? Are there any companies so low?

Witness: I can tell you many which are much lower.

The CHAIRMAN: Which is the lowest?

Witness: In the case of Bath a committee of this House fixed the maximum at the actual price charged by the company. They are now supplying at 2s. 10s., and paying the maximum dividend. At Plymouth the company are charging 2s. 9d. I do not know what their maximum is.

Mr. LLOYD: Are you certain that this company are fairly protected by a maximum of 4s.?

Witness: O dear, yes! They never can charge 4s., unless they improperly charge to repairs what ought to be charged to capital.

Cross-examined by Mr. DENISON: There are many places in which the maximum is higher. Each place has to be determined, within reasonable limits, according to circumstances. At Bath, at the time of obtaining their Act, they were able to pay their maximum dividend with a price of 3s. 9d.: since then they have been able to manufacture gas cheaper.

Mr. DENISON: They were prohibited paying more than their maximum dividend?

Witness: Yes.

Mr. DENISON: Is not that a proper protection?

Witness: It should be.

Mr. DENISON: Why is it not here?

Witness: I see what the company have done in expending money improperly.

Mr. DENISON: There is a proper mode of investigating their accounts, I suppose?

Witness: Yes. But I know what investigating accounts at quarter sessions is.

Mr. DENISON: Then you want the General Act altered?

Witness: Quite so.

The CHAIRMAN (the committee having consulted): The committee are of opinion that 4s. ought to be the maximum here.

Mr. LLOYD: That will be to private consumers. Then we ask for the usual allowance to us as large consumers for the gas supplied to the public lights.

Mr. DENISON: What do you ask?

Mr. LLOYD: We ask 6d. At present, under the existing Act, we are entitled to 20 per cent. The present Act gives us in express terms a special maximum price of our own, which is 1s. per 1000 less than the charge to the private consumer.

The CHAIRMAN: We are leaving you at the same rate as you are now paying.

Mr. LLOYD: We are actually paying 3s., and the public consumer asks a distinction in his favour because he consumes largely; there is no expense for collection, and there is less leakage. In fact, he is a very profitable consumer.

Mr. DENISON: I am old enough to remember that it was at one time received as an axiom in Parliament that the public lights should be charged at a less price than that paid by the private consumers, but I also remember that in time Parliament came to recognise the fact that this was only an indirect mode of making the consumers generally pay the town rates. We are willing to let you have gas at the lowest price charged to any private consumers.

Mr. LLOYD: My friend offers what in a general way is fair. But there is no comparison between Cheltenham and a manufacturing town, because here there are no large consumers.

The CHAIRMAN: We shall leave the clause as it is.

On clause 11—"Tramway to be private property"—

Mr. LLOYD proposed to strike out the whole clause.

The CHAIRMAN: We have had this argued.

Mr. SOMERSET: Whatever facilities we can give to the commissioners we are willing to give.

The CHAIRMAN: We have had all this argued out on preamble.

Mr. LLOYD: I understood that it was only agreed that the tramway should be constructed. We ask to be allowed to use it for public purposes, paying a reasonable toll.

The CHAIRMAN: That was one of the three points you put forward. It is quite clear that clause 11, in accordance with our previous decision, will remain in the bill. Whether another clause shall be brought up to enable you to obtain facilities, is another matter. We do not think this clause should be altered.

On clause 13—"Power to raise additional capital"—

Mr. *Hawksley* recalled, and examined by Mr. SOMERSET.

I have no doubt that the £80,000 additional share capital, and £20,000 borrowed money, will be required for the purposes of this Act before the expiration of 11 or 12 years. A gas-works to make, say one million cubic feet, has hitherto required as capital, and money to work the concern, 2s. per cubic foot of supply for the period of the largest make. This represents exactly one million cubic feet upon that scale, and if we erect works to make one million feet extra, it would require £100,000 upon the old data of cost. But now things have so gone up in price, that I have no doubt it will require 2s. 6d. per 1000 cubic feet.

Mr. SOMERSET: Explain to the committee how and when this money will require to be laid out.

Witness: About £28,000 must be laid out in three years. The remainder must be laid out from time to time, as extensions are required, till at the end of the period I have spoken of the whole will be raised.

Cross-examined by Mr. LLOYD: The company have made 900,000 feet a day, and their capital expended is £88,000, which is about 1s. 11½d. per 1000 feet, but I find it almost everywhere the case that works which are properly conducted, and have a proper amount of working capital, may be said to require 2s. per cubic foot for the greatest daily consumption.

Mr. LLOYD: That is so on the present capital, with the present works?

Witness: Yes.

Mr. LLOYD: But the land is there, and the greater part of the works is there?

Witness: Yes; but they will want more land.

Mr. LLOYD: Where?

Witness: I cannot say where, but as near to the place as they can get it.

Mr. LLOYD: To manufacture on?

Witness: No; to store gas, coal, coke, lime, oxide, and various other things.

Mr. LLOYD: £28,000 is wanted now. Of the remaining £72,000 how much do you expect to go into the works, and how much into the mains?

Witness: It is very difficult to say, but I should think not more than £5000 upon mains.

Mr. LLOYD: What has been spent altogether on the works?

Witness: Altogether £88,000, but a part of that is employed in carrying on the concern. I should think £40,000 or £45,000 have been expended on the works.

Mr. *G. W. Stevenson* recalled, and examined by Mr. LLOYD.

I think the additional capital asked for is excessive. The company have been in existence 53 years, and have spent £88,000. The works, so far as I could tell from an outside view, are in good condition. There are large new gasholders, a new purifying house and purifiers—they are very complete works. During the last two or three years there have been large charges for repairs and reconstruction. The gasholder-room at present is in excess of their requirements. I am not aware that they require any expenditure. So far as the future is concerned there will not be much required on account of increased population. There will be a certain addition from fresh consumers coming on, but it will not be in the ratio of past years. There are few houses rated above £10 which do not take gas. A certain increase will take place per head, but I think, from the large consumption now taking place, there is not much room for a greatly increased consumption. But if the consumption be doubled in ten years the company will not want double capital. I should think if the consumption increased in that period from 25 to 40 per cent. they would do well. With established works you may double the supply with 30 per cent. additional capital. I think this company ought to have a liberal addition to carry them on for 12 or 15 years, and I think £30,000 to £40,000 would do that. The cost of making the railway should be added to that, and there should be borrowing powers in addition, making the total up to something like £50,000, which would be very liberal indeed.

THE CHAIRMAN: The committee are of opinion that the clause should stand as it is.

Clauses 28 and 29 were taken together.

Mr. LLOYD objected to the proposed standard of illuminating power of the gas—14 candles, tested by Sugg's burner—as insufficient; and he contended that the testing place should be at a distance from the works.

Dr. *Letheby*, examined by Mr. SOMERSET.

The pressure of 7-10ths in this clause is a very good average pressure, because it must be considered that there are many places in Cheltenham which are situated at a low level. The company will be bound to maintain 7-10ths there, which may make it at the high levels an inch or an inch and a half. Seven-tenths is a very good pressure, provided it is at the disposal of all the consumers. It is a very serious thing for a company to have too high a pressure, because of the increased leakage it occasions. The prescribed illuminating power in this clause is a usual thing in Acts of Parliament, and it is also usual, out of London, to test the gas at the works. In London, the testing place is, as near as may be, 1000 yards from the works. The provisional orders of the Board of Trade, without exception, provide for testing at the works. As to the burner here described, it is the one employed by the London referees, and pretty nearly everywhere, for testing gas under all recent Acts of Parliament. In my opinion, it is a proper burner for the purpose.

Cross-examined by Mr. LLOYD: I remember the bill of the Birmingham and Staffordshire Gas Company being in Parliament. In that case it was left to me and Mr. Bowditch to settle a burner, which we did, and which still goes by the name of the Birmingham burner. It has been prescribed in two or three subsequent Acts.

Mr. LLOYD: The same gas which, burned in a Birmingham burner, will give only 12 candles, will, when burned in Sugg's burner, give 14?

Witness: That is so.

Mr. LLOYD: So that here, as you are proposing to define it, though we are talking of 14 candles, it is only the same thing as if we were talking of 12, if we put in the Birmingham burner.

Witness: It is so with regard to the proportion of light.

Mr. LLOYD: That is so at the works?

Witness: Yes.

Mr. LLOYD: Now, it is a fact, of course, that as gas travels a considerable distance, it loses illuminating power?

Witness: Yes. Much depends upon the condition of the main, but as a rule it loses illuminating power.

Mr. LLOYD: What distance may I take it as affecting it to the extent of one candle?

Witness: About 1000 yards, but that would depend upon the condition of the mains.

Mr. LLOYD: But supposing the mains carefully looked after, you would lose a candle per 1000 yards?

Witness: It is not so always, for I know, as a matter of fact, with regard to two or three works, the gas does not lose illuminating power; but it usually is so.

Mr. LLOYD: The effect, then, would be that here a person 1000 yards off would be only getting 11-candle gas?

Witness: I admit all that, but it comes to this at last—it is a question of price—if you put 14-candle gas to be measured 1000 yards from the works, the company could not undertake to supply it at 4s. I take it that the price has been founded upon the understanding that the gas is to be tested at the works with a London Argand burner. These two conditions are introduced into the bill, because they are the common conditions of every Act of Parliament, and the price has been calculated accordingly; but if it was understood that the testing should be at 1000 yards from the works, that is an entirely different condition of things.

Mr. LLOYD: What have the company been supplying?

Witness: It was a little over 13 candles by the Birmingham burner when I tested it.

Mr. LLOYD: Therefore considerably above what is fixed in this bill?

Witness: Yes; but you must understand the company are bound to supply gas of at least one candle above the illuminating power prescribed in their Act. They cannot run so near to the line as to be perpetually in danger of a fine.

Mr. LLOYD: Are you aware that by the agreement between them and the commissioners they are bound to supply 15-candle gas by Sugg's burner?

Witness: Yes; and this must be 15.

Mr. LLOYD: Why, if they could bind themselves, seven years ago, to supply the town with 15-candle gas, cannot they do so now?

Witness: Because then they would have to give 16, and the conditions of things are so essentially altered since then—coals, labour, and iron have risen; and that which they could do a few years ago with a prospect of profit, they cannot do now. They would be obliged to use a large proportion of cannel coal, which is becoming rare and costly.

Mr. LLOYD: You say 14 candles is the usual number, and Sugg's burner the usual burner. How long has that been so?

Witness: It was prescribed by the referees in 1868 or 1869, and during the recent legislation for London. Take the case of the Imperial and South Metropolitan Companies. Parliament, instead of fixing the standard at 16 candles, as they had done for the City of London companies two years before, lowered it to 14 candles. If you could introduce all the regulations of the metropolis, with testers paid by the local authority, &c., and with provision for the case of disputes by appeal to referees, no doubt it would be advantageous to have the gas tested at 1000 yards distance; but the cost of that would be so great to the commissioners and to the gas company—about £700 or £800 a year—it could not be done. It is not a fair thing to have occasional testings made; they must be continuous; and the cost is so large that such an arrangement is not applicable out of London.

Cross-examination continued: It is not usual now to have a test for sulphur compounds. There is only one thing which can reduce the sulphur in gas below 20 grains per 1000 feet, and that is lime. If companies are so situated that they cannot use lime, they are driven to use oxide of iron.

The CHAIRMAN: Is it absolutely impossible to use lime at Cheltenham?

Witness: As far as my knowledge of the station goes, I should say not; but those who know the place better than I do, think it is.

Re-examined by Mr. SOMERSET: These conditions have never been imposed upon country companies. Unless the conditions of the place are known, it is impossible to prescribe tests for sulphur.

Mr. *Hawksley* recalled, and examined by Mr. SOMERSET.

With regard to ammonia, it is easily taken out of the gas, and at these works they do it because they manufacture sulphate of ammonia. I think indeed they wash their gas rather too much. There really is no ammonia in it. The Board of Trade orders have fixed the maximum at five grains per 100 feet. There is no great objection to having testings here if taken at the works, but they would not be of much value when taken. Nor is there any objection to the testing for bisulphide of carbon at the works, but it is very unusual to impose it in the case of provincial gas companies. The provision is sometimes inserted in the Board of Trade orders. There is no reason why, in provincial towns, there should not be the same tests as in London, if competent persons could be found to conduct them. But this cannot generally be done, and a £20 penalty attaches to every default, and there is no appeal. It is usual that the testing place for illuminating power should be at the works, but there are exceptions. It is entirely a question of price.

Mr. *G. W. Stevenson* recalled, and examined by Mr. MICHAEL.

I have here a list of places where the testing takes place at a distance from the works. I have taken out the precedents for the last seven years. As a general principle the gas ought to be tested where the consumer burns it. When 14-candle gas is prescribed it means 14 candles to the consumer, and not at the works. There are many precedents for prescribing sulphur and ammonia tests. It is objectionable that there should be any ammonia in gas, and in London it is absolutely free from it.

Mr. MICHAEL: We are quite ready to take 5 grains of ammonia and 20 grains of sulphur.

Mr. SOMERSET: We have a general objection, but if we are to have a clause at all we will agree to that.

Examination continued: There are two candles difference between Sugg's and the Birmingham burner. I have a large number of Acts of Parliament here, passed during the last few years, in which the illuminating power is fixed at 14 candles by the Birmingham burner.

The CHAIRMAN: But these do not say where the illuminating power is to be tested.

Mr. MICHAEL: Supposing the gas to be perfectly made, so that there would be no deposit of the illuminating hydrocarbon, there would of course be no loss at 1000 yards distance.

Witness: I think, where gas is made from one description of coal, there is very little loss at the distance of 1000 yards, but where made from a combination of coal and cannel there is much loss.

Cross-examined by Mr. SOMERSET: It is true there are only three or four places where the true Birmingham burner is used. All these matters are matters of price.

Charles Heisch, Esq., examined by Mr. MICHAEL.

I am a Fellow of the Chemical Society, Professor of Chemistry at the Medical School, Middlesex Hospital, and superintending gas examiner of the City of London. I have devoted a great deal of attention to gas examination.

Mr. MICHAEL: Do you agree with other witnesses as to the difference between the two burners?

Witness: I think it has been understated. I can give cases in which 14-candle gas, by Sugg's burner, has been only 11¼ by the Birmingham burner—or scarcely that—and this as the mean of an immense number of observations.

Examination continued: I should certainly prefer putting in a Birmingham burner, unless a much higher illuminating power was prescribed. The best testing place is among the consumers. I have heard the evidence given as to difficulties which would arise as far as testing is concerned. In my experience no such difficulties have ever arisen, and I cannot conceive how they should do so, or that penalties would be inflicted which were not deserved. The company's officer would be able to make observations with the tester. There could scarcely be concurrent tests going on, because two persons could not be at the photometer together. As to impurities, there can be no difficulty in checking the tests. For impurities the test occupies 24 hours. The products of combustion are collected, and a certain portion is taken for testing. The tester for the commission could take one portion, and the gas officer another; and if each took a quarter, there would be sufficient left for reference hereafter if they disagreed.

Cross-examined by Mr. SOMERSET: If there were complaints made before a justice of the peace, both parties would be heard, but one test would be the official test; the other would not. There is a certain expense attending these testings. I think that persons sufficiently instructed to carry out these manipulations might be found in country places. I know the penalties for non-compliance with the statute are severe. The burner I use in London is a Sugg's burner. That burner is strongly objected to on the part of the corporation, and it is now under consideration whether it shall be altered. One of the parties to the Act of 1868 has always protested against it. It was used on the recommendation of the referees.

Mr. SOMERSET read the clause of the Act of 1868 relating to the appointment of proper persons as gas referees.

Witness: I do not myself see the necessity of referees at all, if you prescribe the burner and the method of testing.

Mr. SOMERSET: Do you happen to know that it costs £5000 a year in London?

Witness: I know it costs a great deal.

Re-examined by Mr. MICHAEL: The appointment of referees has nothing to do with a country town. Not a farthing expense would fall upon the gas company by the appointment of a gas examiner.

Mr. LLOYD and Mr. SOMERSET respectively addressed the committee, and the latter had only just closed his remarks when it was announced that the House had risen, it being six o'clock.

The committee consulted for a short time, when

The CHAIRMAN said: We may as well intimate to the parties now what our decision is, and will formally give it to-morrow morning. Our decision is that, as far as the place for testing the gas is concerned, we shall leave it as it stands in the bill; but, looking at all the circumstances, we are unanimous in raising the illuminating power from 14 to 15 candles by Sugg's burner. We have also come to the decision that there should be a clause inserted, in the terms of the General Act, for testing for sulphuretted hydrogen.

Mr. SOMERSET: At the works?

The CHAIRMAN: At the works,

Mr. MICHAEL: And for sulphur and ammonia?

The CHAIRMAN: You will agree about that. I also give an opinion that the clause 11A cannot be inserted.

THURSDAY, JULY 4.

The clauses were this morning proceeded with.

On consideration of clauses 28 and 29, taken together,

Mr. MICHAEL proposed to alter the minimum pressure at which gas should be supplied from 7-10ths to 8-10ths, without which he said no cooking by gas could possibly take place in Cheltenham.

The CHAIRMAN: I understand 7-10ths is usual.

Mr. MICHAEL: No; 8-10ths is the pressure now put into Acts of Parliament. We really want an inch.

Mr. *Hawksley* recalled, and examined Mr. FALLON.

A pressure of 7-10ths is abundant. This pressure is a pressure not at the works, but at the extremities of the town and in every part of the town. A day pressure to that extent is abundant for everything, and I know of no instance of late in which Parliament has sanctioned more. The question of pressure is a question of leakage.

Cross-examined by Mr. MICHAEL: Gas cooking-stoves can be used with a great deal less pressure. In London, an inch pressure is required, because there are deep cellars, as at the docks and other places, which are lighted with gas, and these are below the level of the street-mains. Every 30 feet depth makes 3-10ths additional pressure necessary, and there are plenty of cellars of that depth in London.

Mr. MICHAEL said he would call no evidence on the point, because it could only be in direct contradiction. He could only remark that, an inch pressure being fixed for London, there was no reason why it should be less at Cheltenham.

The CHAIRMAN: We are all of opinion that it should stand at 7-10ths.

The remaining clauses of the bill were then gone through and agreed to.

On the postponed clause 4 being considered,

Mr. MICHAEL proposed to add these words: "Nothing in this Act or the recited Acts contained shall authorize the company to convert into capital any moneys borrowed, or to be borrowed," &c.

Mr. FALLON said he objected to the addition, because it proposed to alter existing legislation. The company would agree to the words "provided that the company shall not convert into capital any moneys to be borrowed under the powers of this Act," but they would not consent to such a limitation in respect to moneys borrowed under the old Act.

Mr. MICHAEL said when the company were before Parliament in 1856, by a side wind they obtained power to do that which Parliament certainly never intended in this respect.

The CHAIRMAN asked why the commissioners did not oppose in 1856.

Mr. MICHAEL said he could not answer the question, but he thought, as the company were now coming forward to alter the old condition of things, it was reasonable to attempt to correct that which escaped the attention of the Legislature in 1856.

Mr. FALLON said all the company asked was to be allowed to remain as they were, because the proposed alterations would seriously affect the interests of their shareholders, many of whom bought shares on the faith of the existing state of things. They were quite willing, in reference to the moneys borrowed under the present bill, that the limitation should be imposed.

Mr. MICHAEL said he was at a loss to know how the old shareholders could be affected by the provision, and, as to new shareholders, he was going to bring up a clause providing that all new shares should be sold by auction.

The CHAIRMAN said he thought both propositions should be discussed together.

Mr. MICHAEL read the proposed auction clause. He said the object was to prevent the company having an inducement to create new capital for the sake of obtaining premiums on the shares, and also to furnish an opportunity for the consumers to obtain an interest in the undertaking. He could produce evidence showing that such a clause had been introduced into a number of Acts.

The CHAIRMAN did not think it was necessary, and said the committee were unanimously of opinion against the auction clause, but they were also of opinion that the prohibition against converting borrowed money into capital should extend to all the borrowed moneys under both Acts.

Clause 4, so amended, was then put and agreed to.

The CHAIRMAN said a clause had been given to him to the effect that penalties should not be incurred in any case of unavoidable cause or accident.

Mr. MICHAEL said he had no objection to it with a rider. At present the penalties came out of the pockets of the consumers, because it came out of the general joint stock of the company. The practice now was to impose the penalties upon dividends, and, therefore, he should desire to add to this clause, "All penalties payable under the 36th section of the Gas-Works Clauses Act, 1871, shall be borne and paid exclusively out of the profits of the company, by way of deduction out of dividend."

The CHAIRMAN: Is there any clause in the Act of 1871 which imposes the penalty upon dividend?

Mr. MICHAEL: No.

The CHAIRMAN: Is there any precedent at all for it?

Mr. MICHAEL: Yes; in the City of London Gas Act, 1868.

The CHAIRMAN: Have you any precedents in provincial Acts?

Mr. MICHAEL: No; but it is in the Imperial and South Metropolitan Acts, as well as the City of London Gas Act.

Mr. FALLON said these Acts were passed three years before the General Act of last session. Mr. Hawksley told him there was no precedent for such a clause in any provincial Act. It would create great inconvenience, as, whatever penalty was incurred, would have to be apportioned rateably among the shareholders.

The CHAIRMAN: Whose fault is that? The Act of Parliament imposes certain penalties for certain defaults, and the company say we are quite willing to pay the penalty, but it shall come out of other people's pockets. What inducement is there to them to see that gas of proper quality and illuminating power be supplied, if they know that they will not have to put their hands into their own pockets on failure to do their duty.

Mr. FALLON: This would apply to all companies—railways and others.

The CHAIRMAN: No; because railways are not bound to reduce their fares on paying a certain rate of dividend. We are quite agreed upon the principle, but we would rather follow the words of the City of London Gas Act.

The clause was postponed in order to be altered.

Mr. MICHAEL brought up a clause providing that the company should pay interest on all moneys deposited with them as security for gas-rents. He said it was in conformity with the provisions in modern Acts, and in all provisional orders.

Mr. FALLON said the company would accept the clause.

Mr. MICHAEL proposed a clause to the effect, that if at any time within five years from the passing of this Act the Cheltenham Improvement Commissioners, or other local authorities for the borough, desired to purchase the said gas-works, and undertaking of the company, and the property connected therewith, and should give six months notice of such desire, the company should be required to sell the same, and all their rights and interest therein, for such terms and on such conditions as might be agreed upon, and failing agreement on such terms as might be determined by arbitration in the manner provided by the Lands Clauses Consolidation Act, 1845. He said it was hardly necessary for him to enter upon a lengthened argument to show how desirable it was that both gas-works and water-works should be in the hands of the local authorities. By this clause it was provided that it should only be done by agreement or arbitration. By the 56th section of the Commissioners Act they had power to erect works themselves for public lighting purposes, though they had no authority to supply private consumers; but it was hardly desirable there should be two sets of gas-works in the town. He relied upon the general principle that it was expedient such undertakings as these should be in the hands of the local authorities, where the transfer could be made at a fair price and without injury to the company. He might state that all recent arbitrations had given very fair prices to gas companies.

Mr. DENISON said he would call Mr. Hawksley, and ask him a few questions on the subject.

The CHAIRMAN: We do not think it necessary. We do not accept the clause.

Mr. MICHAEL now brought up the amended clause relating to the imposition of penalties on dividends.

Mr. DENISON objected to the terms of it, and said the opponents of the bill wished to carry this point further than the committee intended. It was made to apply to the public lighting, a matter which was dealt with in the Act of 1871.

The CHAIRMAN: What we meant to decide was with reference to impurity and quality.

Mr. MICHAEL said this clause was an extension only in this sense, that it included all the penalties imposed in the old Act of the company and the new.

The CHAIRMAN: I think this clause should be drawn as we intended it at the time—to apply to purity and quality.

Mr. DENISON: It is easily done. It should be, "The penalties imposed upon the company for not supplying gas of the purity and quality defined in this Act," &c.

Mr. MICHAEL said the committee said they adopted the words of the Act of 1868, which applied to price, purity, and quality, as well as the supply of the public lamps.

The CHAIRMAN said the attention of the committee was not directed to anything else but purity and quality when they gave their decision. He thought, perhaps, pressure ought to be added, but as to the public lighting, the power of the commissioners over the company was sufficient.

The clause was then altered as follows, and agreed to:—"All penalties imposed by the Gas-Works Clauses Act, 1871, for default in pressure, purity, and illuminating power shall be borne and paid exclusively by and out of the divisible profits of the company by way of diminution of dividend."

Mr. MICHAEL next proposed a clause, to the effect that the company shall, within one month of the passing of the Act, deposit at the public office at Cheltenham, a model of the burner defined by this Act, certified by the London referees, to be kept by the clerk of the commissioners.

Mr. DENISON objected to any such proposal.

Mr. *Hawksley* recalled, and examined Mr. SOMERSET.

This is an attempt to introduce a clause which has several times been proposed, and as often refused. It is importing new legislation into this bill altogether. The burner here described is very well known.

The CHAIRMAN: Is there any obligation on the part of the London referees to certify a burner in this way? If not, I do not see how they can be called upon to do it.

Mr. MICHAEL: We are quite willing to adopt any other authority—say any gas examiner of acknowledged reputation. It is as much in the company's interest as in ours.

The CHAIRMAN: Is there any doubt about Sugg's Argand Burner?

Witness: None whatever.

Mr. MICHAEL: The Government report says there is the greatest difficulty. Disputes have already arisen upon the question, and the report of the gas referees to the Board of Trade show that there must be something of the kind.

The CHAIRMAN: We are against you on this point.

Mr. MICHAEL: Now I have another clause to propose as to the position of the testing-place. It is in effect that it shall be so situated that all the gas supplied to the town shall freely pass through such testing place.

Mr. *Stevenson* recalled, and examined Mr. MICHAEL.

It is desirable that the testing place should be so situated that all the gas supplied to the town should pass through it.

Mr. MICHAEL: Otherwise might it not happen that there would be two exit-pipes from the works, one of which would not go to the testing place at all, so that half the gas would be tested, and half not, especially as, in this case, the gasholder is separated from the works by a road?

Witness: This is the usual clause in almost all Acts of Parliament.

The CHAIRMAN: Have you an Act of Parliament containing it?

Witness: I do not know an Act of Parliament without it.

Mr. DENISON: Is it in the London Acts?

Witness: No; I am speaking of provincial Acts.

Mr. DENISON: That is to say, you have picked out some in which it appears. But in the first one I ask you about it has not been inserted?

Witness: In the City of London Gas Acts the testing place is 1000 yards from the works.

Mr. DENISON: Is there such a clause in any of the London Gas Acts?

Witness: I do not think there is.

Mr. DENISON: How many provincial Acts do you find it in?

Witness: I think it is in all.

Mr. DENISON: No; I will not have that.

Witness: Where the gas is tested on the works.

Mr. DENISON: But you have not one to produce?

Witness: I have not one here.

The CHAIRMAN: I think it is a reasonable clause.

Mr. DENISON: I must call Mr. Hawksley.

The CHAIRMAN: What can be the objection? It is quite clear you mean all the gas to be tested. You do not want some loophole.

Mr. DENISON: The question is far too scientific for me to discuss; but I cannot have the decision given against me so hurriedly.

Mr. *Hawksley* recalled, and examined by Mr. DENISON.

I have seen the clause proposed. It is objectionable in this case, and also in a great many cases. It is an exceptional clause, usually dealt with according to circumstances. In this case, as happens also in London, there are a variety of mains going out of the works in different directions. To effect the object here sought, we must alter our works and bring all these mains together, and then bring a pipe into the testing-room from where these mains are aggregated. By doing that undoubtedly this end could be effected. But it is not found necessary here or in London. The clause goes on the suspicion that we can make two qualities of gas, and can be supplying one quality in one direction and one in another. It is merely, if I may so express it, a vulgar suspicion. We are not making two qualities of gas, and the test upon one main is just as good as upon another.

Mr. DENISON: Does it all come out of the same place of manufacture?

Witness: It all comes from the same gasholder. The principal main is that which supplies the High Street, and if they will be so good as to say the testing shall be upon that or upon any other main they please, we are willing; but to alter our works, for the express purpose of this clause, is not required. A number of mains go out of the works in the metropolis, but the gas is tested upon only one of these at a distance of 1000 yards.

Cross-examined by Mr. MICHAEL: There are four exit mains from the works. The distance from their exit to some central testing-place would be, perhaps, 290 or 300 feet, but the gas taken at that distance for testing purposes, after lying there some hours, would have suffered a certain diminution of quality, and would not represent the quality of the gas going into the town.

By the COMMITTEE: All the gas made at the works passes through the

station-meter, and from thence goes into the gasholders. There it remains for some hours, and the illuminating power of the gas taken from the gasholders is not quite so good as the gas going through the station-meter. Besides that the gas going through the station-meter is of a variable quality, because it is not mixed up as it is in the gasholders.

The CHAIRMAN: We are of opinion that this clause may be inserted.

Mr. MICHAEL: As to the purity of the gas and the mode of testing, it was assented on the other side that 5 grains of ammonia and 20 grains of sulphur should be the limit. I have here a clause to carry out that object.

Mr. DENISON: Mr. Hawksley tells me that unless a particular mode of purification is adopted it is impossible to agree to this.

Mr. *Heisch* recalled, and examined by Mr. MICHAEL.

Five grains of ammonia per 100 cubic feet is a fair maximum quantity to put in, but as regards the 20 grains of sulphur I am not quite sufficiently acquainted with the position of the Cheltenham works to speak positively. In London, at works where they can use lime, the quantity is fixed at 15 grains from the 1st of October, but for works where lime cannot be used it will stand at 30 grains.

Cross-examined by Mr. DENISON: I do not know enough of the Cheltenham works to say whether they can use lime in the purification. There is a great difficulty in using it in some places because of the offensive smell it occasions.

The CHAIRMAN: We heard this in evidence yesterday.

Mr. *Hawksley* recalled, and examined by Mr. DENISON.

There is a difficulty in using lime at these works, because they are situated in the immediate vicinity of the town. The company have been driven already to have recourse to oxide of iron to avoid the nuisance occasioned by lime.

Mr. DENISON: My learned friend says they do use some lime.

Witness: Yes; and Dr. Letheby gave it in evidence, that though they use some, it is not sufficient to bring the sulphur down to the quantity required by this clause. The lime is used not for this purpose at all, but to absorb the carbonic acid, which is a totally different thing, and the results as regards nuisance are different. We could do with 30 grains of sulphur, using oxide and a small quantity of lime, but if 20 grains are inserted, we must abandon the oxide and go to lime as the principal agent of purification. I am bound to say we can do it, but there would be great difficulty. We do not object to 5 grains of ammonia.

Cross-examined by Mr. MICHAEL: Carbonic acid displaces the sulphur compounds. What happens is this: when lime is first put in fresh it takes up the sulphur compounds, and then the carbonic acid, having a more powerful affinity for the lime than the sulphur, drives out the sulphur compounds. This does not involve anything more than the frequent changing of the lime; but that is making the nuisance even greater.

The CHAIRMAN: Can you do with less than 30 grains?

Witness: I think not, to avoid penalties. This is a penalty clause. We shall keep it down as low as we can.

The CHAIRMAN: The committee agree to fix it at 30 grains.

The clause, as altered, was adopted.

Mr. MICHAEL: The next clause we propose is for ascertaining the pressure, and it is in effect that the Cheltenham commissioners shall be at liberty to affix to one or more service-pipes a registering pressure guage, as near as possible to the main from which the supply to the public lamps is obtained.

Mr. DENISON refused to assent.

Mr. *Stevenson* recalled, and examined Mr. MICHAEL.

I think it is reasonable to allow the commissioners to test the pressure at the public lamps. It is a perfectly fair proposition, but I think the gauge should be open to both parties.

Cross examined by Mr. DENISON: I do not know of any precedent for this clause, but I think it is reasonable.

Mr. *Hawksley* recalled, and examined Mr. DENISON.

This clause is new to me. The objections to it are very obvious. The first is that it makes the test depend upon an instrument entirely. There are to be many instruments placed in various parts of the town, which it is assumed will be giving correct registrations. But supposing upon a small pipe in the town a consumer turns on a great many lights, the pressure in that pipe must necessarily descend. That descent will be registered on the paper connected with this pressure gauge, and then a penalty will follow. We have no control over the consumers in the way in which they will deal with the gas, and therefore we cannot be sure that upon some particular pipe there may not now and then, for a short time, be a deficiency of pressure. The company may be continually subjected to penalties for giving a lower pressure, when in fact it is not so. It is easy to create a low pressure, and we should never know by whom it was done, and yet all the time this instrument would be registering against us. We have 69 miles of mains, and what goes on over those mains we cannot possibly tell.

Mr. DENISON: This is a clause which involves no discretion at all. The instrument may be wrong. There is no provision for any one to look after it, and it may give any kind of result.

Witness: Yes; and there are to be a great number of them.

Mr. DENISON: So that, although 9-10ths of them may be showing the proper pressure, yet, if 1-10th show an under pressure, you will be liable to a penalty.

Witness: Yes; and we have 4000 consumers, all possessing more or less a control over the pressure. Any ill-disposed person might run off a quantity of gas and reduce the pressure in the main locally, and we shall be subject to a penalty.

Mr. DENISON: It is impossible the pressure can be registered anywhere too high.

Witness: The pressure will be different in every main in every part of the district, according to the consumption going on locally. The means which now exist to ascertain pressure are perfectly easy. (Witness explained the nature of the ordinary pressure gauge and its mode of action.)

The CHAIRMAN: I can quite understand that by the ordinary pressure gauge the company can ascertain the pressure, but can the consumers do it.

Witness: Yes; and the inspectors of the Cheltenham commissioners. What I object to is to be subjected to a self-registering apparatus, which may be locally affected.

Cross-examined by Mr. MICHAEL: Most gas companies use this self-registering gauge, but for a totally different purpose. The clause now proposed does not indicate the only means for ascertaining the pressure at the public lamps.

The CHAIRMAN: What is wanted is to find, under the provisions of the Act, the pressure in the mains of the company at the junction of the service-pipe. Am I right in understanding you to say that if you, having tested the pressure at the service-pipe in a house, were to go into the witness-box, you could tell the justices, as a matter of certainty, what the actual pressure was at the junction?

Witness: I could.

Mr. MICHAEL: If we went before a justice we should be met with the objection that we had not tested at the junction. Have you any objection to these words, "For the purpose of the testing, &c., the pressure at the inlet of the consumer's meter shall be deemed to be the pressure at the junction?"

Witness: Half-a-dozen objections, and very potent ones. First of all, the consumer's meter may be above or it may be below in a deep cellar. Besides that, there is no provision whether it shall be taken when the gas is burning or not. If the meter is a great distance from the main there is all the friction which the gas experiences in passing through the length of service-pipe, and which reduces the pressure.

Mr. MICHAEL: We are entitled to the pressure at the burner.

Witness: No, you are not. You can determine the pressure at the inlet without testing at the inlet, if you only take the precaution that there shall be no current of gas passing through the pipe—that it shall be dead gas at the time.

Mr. MICHAEL: Would not all these difficulties prevent the recovery of penalties, by starting the objections at the time?

Witness: Certainly not.

Mr. MICHAEL: Can we interfere with your main at the point where the service joins without your consent?

Witness: You cannot; but you do not need it. You can test upon your own pipe at the junction.

The CHAIRMAN: I think we need not trouble you any further about it. The clause is rejected.

Mr. MICHAEL brought up a further clause for regulating the construction of the tramway at the point of crossing the public road on the level.

The clause was agreed to.

Mr. MICHAEL finally proposed a clause saving the rights of the commissioners, which was objected to by Mr. DENISON, and, after some conversation, it having been pointed out that the company's Act, 1856, contained a saving clause, the committee decided to accept a similar clause.

The bill, as amended, was then passed, and the chairman was ordered to report the same to the House.

Legal Intelligence.

EXETER CITY QUARTER SESSIONS.

MONDAY, JULY 1.

(*Before Mr.* H. C. LOPES, Q.C., M.P., *Recorder, and a Bench of Magistrates.*)

THE EXETER WATER COMPANY *v.* THE JUSTICES OF EXETER.

This was an appeal under the local Act 3 William IV., c. 33. Mr. COLLINS and Mr. MACKAY appeared for the appellants, and Mr. MORTIMER for the respondents.

Mr. MORTIMER admitted the notice of appeal, but called on the other side to comply with the remainder of the section as to recognizances.

Mr. COLLINS said a corporation could not enter into recognizances, but, on behalf of the company John Huxham, Ralph Sanders, and John Geare had entered into recognizances, the former in £100 and the two latter in £50 each. This was all that was required. Mr. Collins contended that the company were not bound to enter into recognizances, and if it was necessary, they could enter into them by surety. He quoted the cases of Cortes *v.* the Kent Water-Works and the Queen *v.* the Mayor, Aldermen, and Citizens of Manchester, in support of his argument.

The RECORDER said he should have been most reluctant to have given effect to this objection even if he thought it a good one, but he did not think it so, and doubted whether it was necessary for the company to enter into any recognizance at all.

Mr. MORTIMER then stated the case. This was an appeal of the Exeter Water Company, who had been summoned and convicted for refusing after demand, and after acceptation of that demand, and after tendering the amount of the rate, for refusing to supply Mr. Damerel, J.P., with water. That gentleman had resided at 62, St. Sidwell's Street for 32 years, and for nearly 30 years water had been supplied to him from the main, and his supply was, therefore, constant. But although he paid the amount of rent authorized by the Act of Parliament, £1 12s. a year, the company, for some reason best known to themselves, made a demand on Mr. Damerel for a further sum of £1, presumably for the privilege of being attached to the main. Now, except within the section giving this rent of £1 12s., there was no mention at all within the Act itself of any money to be paid except in one case—that was for water used otherwise than for household purposes, which did not touch this appeal, so that this claim of £1 was entirely unsupported by any right under the Act, and could not be supported under that Act. But the company's way of maintaining the claim was this: On Mr. Damerel refusing to pay this extra £1 they removed his supply-pipe from the main to the service-pipe, and thus in place of a constant supply he from that time was only supplied for three or four hours a day for five days a week. And not content with this, they then gave him a notice on Nov. 15, 1871, requiring him, within a certain time, to put up cisterns and to fix a ball and stop-cock to each of the pipes conducting water from the main or service pipe to the said cisterns. To this notice Mr. Damerel was willing to comply, and did comply by putting up one extra cistern—making three altogether in the house; there was a cistern for the upper water-closet, a small cistern which supplied the stove, and the third cistern was under the basement floor for another water-closet. The inspector of the water company visited the premises and raised no objection whatever. This continued some little time, when again the company made a further demand on him, not now for £1 but for 10s. That not being complied with, they again gave a notice to him requiring him to put up a cistern to every exit for water in his house, and what was now to be determined was whether under the section they could or could not give such a notice. With this second notice Mr. Damerel did not comply, and thereupon the company turned off the water from his house. He complained to the justices, and the consequence was that the company were fined under the 96th section, and it was against the order of the justices that they now appealed. He believed the application for water, the notice to the company to supply, and the tender of the amount of the rate, would not be disputed.

Mr. COLLINS said he would admit this.

The RECORDER: The question comes to this: were the company justified in cutting off the water?

Mr. COLLINS: The question is this: are the company justified in asking Mr. Damerel to place a cistern to every pipe from the service-pipe?

Mr. MORTIMER said the company could only say they were justified by the 104th section, and in fact the case entirely turned on the interpretation to be put on that section. His contention was that by that section certain matters were to be supplied, but as that section was highly penal, it must be taken as it stood, and if Mr. Damerel had committed any offence at all it was not within that section. There was a cistern upstairs capable of supplying the water-closet, there was another in the kitchen which supplied the boiler, and a third below supplying the servants water-closet. These were all proper and fit for the purpose required, and were so fitted as to prevent any overflow, and were sufficient, if they were filled for the use of the house. To using the water (for drinking and culinary purposes) which ran into the cistern at the top of the house, which was the only one that could supply the upper ones, Mr. Damerel had three objections—one was that it was an external cistern, another that the water of the company, although good when it came in, did not at all keep well, and in the third place the power at the company's disposal was insufficient to force the required quantity of water there. This being so, Mr. Damerel had used the tap in the kitchen, to which the water company had objected; it was attached to the service-pipe without the interposition of any cistern at all. The water obtained from this tap was used for culinary purposes, and there was no pretence to say there was any waste there; had there been any waste it would

have caused inconvenience, as it would have gone over the kitchen, so that there was a very strong reason why the water should not be wasted. This supply-pipe was originally attached to the main, but the company removed it from the main to the service-pipe; the tap attached to this supply-pipe was objected to on the ground that there was no cistern. Now, having put up a sufficient number of cisterns for the supply of the house, had the company power to compel Mr. Damerel to put a cistern to every tap in the house? The penalty the company would enforce for non-compliance was a heavy one, not merely to this house, but to the whole neighbourhood. The words of the Act stated that every person supplied with water should be required to put up proper cisterns, to receive and hold such quantity of water as should be deemed sufficient. Now Mr. Damerel had provided proper cisterns of the required material to hold such a quantity of water as should be deemed sufficient for proper consumption; valve, ball, and stop-cocks had also been fixed and were in good order. The Act only gave power to the company to resort to certain measures in case any person neglected to provide the cisterns which he contended they had provided. Whatever might be the rights of the company under any other section they could not under this section—as Mr. Damerel had complied with it—say they had a right to stop the water in the way they had. If they suspected waste they had power of entry, and if they found that their suspicions were correct, then they could stop the supply; but there was no attempt made to say that there was waste in Mr. Damerel's house, and this being so, it appeared to him that by their action the company were either attempting to get more money than was permitted by the Act by using a threat to put people to the expense of putting up more cisterns, or to put them from the main to the service-pipe; or else the company were attempting to enforce, more stringently than they were entitled to, their rights against the purchasers of their water. If they desired more stringent powers they had a simple course open to them—they had only to take the General Act and incorporate it with their own. But the company had not pursued this course because they knew very well that if they did, the rights of the public would be placed on a fair and proper footing with their own. As long as the company were restricted to this section there was nothing whatever to prevent Mr. Damerel fixing this tap, and they had no right to cut off the supply of water because he used it. Therefore he was quite right in complaining to the magistrates, they were right in fining the company, and therefore the conviction should be upheld. The learned counsel called

Mr. *Dameral*, who gave evidence supporting the opening statement.

In cross-examination the witness said it was quite probable that he told a representative of the company that, waster or no waste, he intended to keep the tap on, because he thought it a case of health and disease, as water coming into the cistern was after a short time unfit for drinking; this was not because the cistern was dirty, but because the water in itself would not keep. There was a trough under the kitchen tap, and a pipe attached to it carried away the water that had been used; should there be an overflow in the drawing of a jug of water that would also go the same way. There was another tap attached to a closet upstairs, but that was never used. He might have told one of the water company's workmen that he intended to fight the company, because "Mr. Sanders told me twelve months ago that he was prepared to fight me, and I am prepared to fight him, and that is all about it."

Mr. COLLINS, for the appellants, said the water company considered this about as important a question as could be tried, for if the court allowed these different pipes and taps to be used it would be utterly impossible for the company to supply a proper quantity of water to the inhabitants of this city. The real question to be decided was this: is the occupier of a house justified in placing any number of cisterns he may choose to say sufficient for the water he requires, and independently of these cisterns to put up taps to pipes in two or three different places to draw off the water before it arrives at these cisterns? Now in this case Mr. Damerel had been very gently dealt with; he had something like six months given him to make the alteration, which the company insisted was absolutely necessary for their safety. But Mr. Damerel refused absolutely to comply with their demands or requests, he chose to say there was no waste from the two taps—one on the second floor and the other in the kitchen—and he brought the case before the magistrates. Now if Mr. Damerel was allowed to continue using this kitchen tap, what was there to prevent any inhabitant of this city from placing as many pipes and taps as he chose to the service-main and intercept the water before it reached the cisterns? and so commit any amount of waste. If it was once allowed that any inhabitant might draw water in this way from the service-pipe, cisterns would be quite useless, and any quantity of water might be drawn from the pipe, and whatever waste there was it would be utterly impossible to check. Mr. Damerel said there was no waste with his pipe—but how could he tell what his servants did? If the 104th section was read and considered, it could be plainly seen what it existed for. It was for the purpose of preventing as far as possible wilful and negligent waste of water, and for that purpose it directed that certain cisterns should be erected on the premises. As to the judges of the sufficiency of the cisterns accommodation, they were clearly the company.

The RECORDER: The words struck me "to hold such quantity of water as shall be deemed sufficient."

Mr. COLLINS: Deemed who by? Clearly the company were the proper persons to order the cisterns and to decide if they were sufficient. He would take an extreme case. If the company were not the judges of the sufficiency, Mr. Damerel might say "I'll have a cistern, but it shall only hold a quart, and the water I want to use for my house for domestic and other purposes I will draw from the pipe without the intervention of the cistern at all." What would there be to prevent him?

The RECORDER: It would be extremely inconvenient. But what we have to consider are the words of the statute.

Mr. COLLINS, continuing, remarked that if it were decided that the company were the persons to say that certain cisterns should be in the house the verdict would be in his favour, because the case of the company was that they were not satisfied with the cisterns in the house and they had required him to provide certain others; if Mr. Damerel wanted to use this pipe he must put a cistern.

The RECORDER: Then if Mr. Damerel deemed that those already up are sufficient, has he not done all that is required?

Mr. COLLINS: But is it not clearly meant that the company are the proper persons to order the cistern or cisterns? As to the length of time the pipes had been on, the company were not aware of the fact until lately, and for thirty-two years, through the connection with the main, Mr. Damerel had actually been using water that he had not paid for. He had no right to have his supply-pipe attached to the main, and, when they found it out, the company put him on the same footing as others—made him draw from the service-pipe. This, no doubt, had given Mr. Damerel some annoyance, and he refused, in spite of their endeavours to persuade him, to place a cistern under the branch tap, and he bid the company defiance. If they looked at the section it would be seen that the whole purport of it was to get the water into the cistern before it was drawn off by servants and other people in the house. But this was what Mr. Damerel very candidly said he would not agree to.

The RECORDER: The general object of this section is to preserve and economize the water.

Mr. COLLINS: And how are they to do this? Why by having cisterns. The effect of a cistern was this: the water was turned on four hours a day for five days a week, and two hours on Sundays; the moment the cistern was filled, the stop-cock answered, and no more water could go into the cistern, but it was forced on to the next house. But Mr. Damerel said "No, I won't do that; the three cisterns become full, and I turn my taps on and let the water run." Now if Mr. Damerel could do this, so could any one else. He might let his cisterns get full, take all the supply he could in that way, and then turn his taps and draw off as much more as he liked. It did away with the object of the cisterns and the stop-cocks, and the rest of it became complete nonsense—they would not be of the slightest good. But as he read the section, no inhabitant had a right to draw a single quart of water without it passed through a cistern with the stop-cock or some such appliance. With the judgment, against which they are now appealing, Mr. Damerel was not confined to one pipe, but he might have twenty if he liked, and so prevent the water going into the cisterns at all. But could he do so on the strict reading of the 104th section. He contended Mr. Damerel could not. This Act gave the company great powers, and it rightly did not suppose that the company would abuse those powers by asking for cisterns which were not necessary. But when they saw cisterns were required they had power to compel their being put up, though in this case they did not resort to the extreme remedy until Mr. Damerel set them at defiance.

The RECORDER thought the company had done quite right so far, and he presumed Mr. Mortimer would admit this.

Mr. MORTIMER: Except in trying to levy black mail.

Mr. COLLINS said if these taps were allowed the cisterns would be quite useless, and so would be the section of the Act of Parliament.

Mr. MACKAY also addressed the court for the appellants, dwelling particularly on the language of the section, by which, he contended, it was evident that it was intended to give the company the power to take the steps they thought necessary to prevent waste.

Mr. MORTIMER said his learned friends seemed to have misunderstood what was the real meaning of the "word waste." Waste was not that which was accidentally overdrawn, but an intentional improper expenditure of the water. A man was allowed as much water as he required, and without he used it improperly he did not waste it. There was no pretence for saying there had been any waste in this case. And these cisterns were not in themselves an absolute protection against waste, for it was quite possible that the parts might get out of order, and there would be the waste just the same. The fact was this section was intended to apply to a continuous service from the main, and not to an intermittent supply. As to Mr. Damerel not having paid for what water he had, it was quite ridiculous to talk about that, for the company themselves were the parties who fixed the supply-pipe to the main. There were other sections in the Act dealing with waste, and the 104th section did not apply to this case at all. The case had not been brought within the meaning of the section, and therefore the conviction by the magistrates ought to be supported on the ground that the company had no right to cut off the supply in the way they did.

The RECORDER said this was no doubt an important case, and as he did not wish to give a hasty judgment, he would reserve his decision until next morning.

TUESDAY, JULY 2.

The RECORDER, in giving judgment, said: This is an appeal by the Exeter Water Company against a conviction for having wilfully neglected and refused to supply John Damerel, an inhabitant of this city, with water for the space of ten days, after demand in writing and tender of the amount of rate for one year, under the 96th section of the 3rd William IV., cap. 32, being an Act for the better supplying with water the city and county of the city of Exeter and such part of the parish of St. David's as is situate in the county of Devon. It is clear that the conviction is maintainable, and ought to be affirmed unless the company can shelter themselves under the provisions of the 104th section, for there can be no doubt—and indeed it is not disputed—that the company have cut off Mr. Damerel's supply of water, and have done this deliberately and intentionally. The company, however, say: We are justified in what we have done under the 104th section of the Act, because Mr. Damerel, after being required by us to do so, has not provided a proper cistern to a certain tap on his second floor. The facts appear to me to be these. There are three cisterns in Mr. Damerel's house—1st, the upper one outside the house, on a level with the second floor, called "closet cistern"; 2nd, another on the first floor, called "ball cistern;" 3rd, one on the cellar floor, called "closet cistern." But on the first floor is a tap in immediate communication with the service-pipe. Any amount of water may be taken by means of this tap, which would pass through no cistern at all; in fact all the water which would otherwise ascend to the upper cistern may be intercepted and be taken without the intervention of any cistern or stop-cock. Now, can it be seriously contended that the 104th section contemplated such a state of things? The whole object of that section is avowedly to prevent waste of water, and it provides that any person supplied with water shall, if required by the company, provide a proper cistern to receive and hold water sufficient for his consumption, and he is required to provide a valve and ball, or stop-cock, and to fix, or cause to be fixed, the same to the pipe conducting the water from the service-pipe to the cistern, and at all times afterwards to keep the same in good repair for the purpose of preventing the water running into such cisterns from running to waste when the same should be full; and in default, and in case of any one neglecting to supply such cisterns, the company may cut off the water. I am clearly of opinion that Mr. Damerel was bound when required (as it is admitted he was) to provide a proper cistern to the tap in question, and that the company, upon his not complying with their legal requirement, were justified in cutting off the water. I entertain no doubt that this case comes within the 104th section of the Act, and any other construction would render the whole object of that section nugatory. The conviction, therefore, will be quashed.

In answer to Mr. COLLINS, who said he did not apply for costs against the justices,

His HONOUR said his judgment would carry costs. He did not mean to say that Mr. Damerel was wrong in the course he had pursued, but if a man refused to obey the orders of a company, he did so at his peril.

Miscellaneous News.

METROPOLITAN BOARD OF WORKS.

FRIDAY, JULY 5.

At the Meeting of the Board this day—Col. HOGG, M.P., in the chair—The CLERK read the following letter from the Board of Trade.

Board of Trade, Railway Department, London, S.W., July 1, 1872.

Sir,—I am directed by the Board of Trade to inform you that they have notified to the gas referees that it is not their intention to renew the appointment of those gentlemen at the expiration of their present term of office on the 1st of September next.

In order that there may be no misapprehension on the part of the Metropolitan Board of Works as to the effect of this decision, I am further directed to explain the grounds upon which it has appeared to the Board of Trade to be undesirable to maintain the establishment of the gas referees as at present constituted, and to state the course which it is proposed to adopt in future for

giving effect to the various Acts which regulate the appointment and duties of the referees.

Upon a careful consideration of the provisions of those Acts, it appears that they all authorize the appointment of three competent and impartial persons, one at least of them having practical knowledge and experience in the manufacture and supply of gas, to act as gas referees, and that every person so appointed shall continue in office for one year only, but shall be capable of re-appointment.

The special duties which the gas referees are appointed to perform are—

1. To prescribe the mode to be adopted in testing the illuminating power of the gas.
2. To ascertain the means employed by each company for purifying the gas and preventing nuisance, and to ascertain the amount of sulphur and other impurities with which the gas of each company may be allowed to be charged.
3. To prescribe the mode to be adopted in testing the purity of the gas.
4. If requested by the local authorities or the companies, to prescribe the mode of ascertaining the quantity of gas consumed by the public lamps.
5. To prescribe the testing-places and apparatus to be provided by each company for the various manufacturing stations.
6. To prescribe the burner to be used in testing the illuminating power of the gas.

As regards the fourth point (prescribing the mode of ascertaining the quantity of gas consumed by the public lamps), the Board of Trade believe that the referees have not been called upon to act. The remaining points have been settled, at all events for the time, by the referees; and the only one upon which any serious difficulty appears to have arisen during the four years which have elapsed since their first appointment, and which cannot be regarded as settled, has been the prescribing of a maximum amount of sulphur to be allowed in the gas supplied by the various companies.

That difficulty has been so far overcome as to enable the referees to propose a maximum of 30 grains per 100 cubic feet of gas from the 30th of September next.

The problem of fixing the maximum sulphur impurity is, however, obviously one of very great difficulty, and can only be settled satisfactorily by persons possessing the highest chemical knowledge and experience. With this important exception, the only duties required of the gas referees for the future will be the occasional revision of the maximum of the other kinds of impurity with which the gas is charged, the inspection and certifying of any new testing-stations which may be rendered necessary by the construction of new works, or by the amalgamation of existing companies, and the prescribing of any amendments which experience may suggest in the form of the test-burner or in the mode of taking the tests.

For these purposes it does not appear to the Board of Trade that they would be justified in imposing permanently upon the gas companies, and, through them, on the gas consumers, the heavy expenses entailed by the existing establishment of the gas referees, amounting, since 1868, to about £12,000, or at the rate of £3000 per annum.

The scheme which the Board of Trade are at present inclined to adopt is to appoint three competent and impartial persons, one, if not two, of whom should be chemists of high reputation, to act as gas referees from the 30th of September next, on the understanding that the question of sulphur impurity is, in the first place, to be thoroughly investigated with the means which science can command, and that their services will also be available from time to time whenever they are required to carry out any of the purposes for which referees are appointed under the various Acts above referred to. Their remuneration would probably be proportioned to the services so rendered for the time being.

A scientific body will by this means be established available for the immediate decision of the sulphur question, and of any other special question that may arise. The requirements of Parliament will be fully met, and the interests of the public and of the companies will be duly protected, whilst on the other hand no permanent or unnecessary expenditure will be imposed on the companies, or through them on the gas consumers.—I am, &c.,

(Signed) T. H. FARRER.

The Clerk, Metropolitan Board of Works, Spring Gardens.

The CLERK also read the report of the Works and General Purposes Committee, which stated, *inter alia*—

Your committee have considered the letter from the Board of Trade referred to them on the 12th of April last, forwarding a copy of a letter from the gas referees on the subject of the purification of gas from sulphur, and stating that the gas referees had fixed 30 grains as the maximum amount of sulphur to be allowed per 100 feet of gas after the 30th of September next. Your committee have also had before them the letter from the gas referees referred to them on the 21st instant, calling attention to the fact that, since the report of the referees pointing out how lime might be effectively used to remove sulphur from gas, the quantity of sulphur present in the gas manufactured at the Beckton and Bow works, where the new process has been used, has decreased to a remarkable extent. The diminution of this impurity is very satisfactory, and your committee trust that it may continue. It does not appear to them that the board need do anything further in the matter at present.

The committee further reported that they had considered the letter referred to them from the St. Olave District Board, requesting this board to obtain the insertion in any bill relating to gas supply, of a clause to enable vestries and district boards to undertake the lighting, cleansing, and repair of the public lamps in their district, and to prevent gas companies from charging a higher price for the gas supplied to such lamps than the price charged to private consumers. The committee recommended that the district board be informed that in the event of a bill being introduced in a future session, this board would willingly assist them to obtain the insertion of such a clause.

Mr. TURNER hoped the board would go a little further than the committee recommended. The reason for doing so was one that concerned the ratepayers of the whole of the metropolis. The St. Olave's Board believed the gas company charged them half as much again as the value of the gas consumed. The placing of meters in each lamp would involve great expense, but certain lamps—perhaps one in twelve—might be taken as tests of the amount consumed. In that way a fair charge would be arrived at, but the company set its face against the arrangement. He moved that the words "would endeavour" be substituted for the words "would willingly" in the report.

Mr. DRESSER ROGERS said the matter was very important. The companies had a large monopoly, and they made no efforts to satisfy their customers.

Mr. LLOYD hoped the board would not pledge themselves to any particular clause that should be introduced. He thought the board should simply say that in the event of a bill being introduced they would consider the whole matter.

After some observations from Mr. COOK and Mr. FREEMAN, Mr. Turner's amendment was withdrawn, and the report, with Mr. Lloyd's suggestion, was agreed to.

SALE OF THE SIDMOUTH GAS-WORKS.—At a meeting of the Sidmouth Local Board last week the propriety of purchasing the gas-works, about to be sold, was considered. After some discussion on the subject, it was resolved that a valuation should be made of the works, and that a special meeting should be held before the sale for taking the valuation into consideration.

REPORT OF THE CHIEF GAS EXAMINER ON THE METROPOLITAN GAS SUPPLY.

Dr. Letheby, the chief gas examiner appointed by the Board of Trade, has recently reported to the Corporation of the City of London and to the Metropolitan Board of Works on the quality of the gas supplied to London by the Chartered, the Imperial, and the South Metropolitan Gas Companies, during the last three months, from which it appears that the illuminating power of the gas at the several testing-places has been as follows:—

Illuminating Power in Standard Sperm Candles.

	Testing-Place and kind of Gas.	Max.	Min.	Average.
Common Gas.	Chartered Company. Beckton, North Woolwich	18·7	16·5	17·54
	Chartered Company. Cannon Street, City	18·2	16·8	17·50
	Chartered Company. Friendly Place, Mile End	18·6	16·8	17·85
	Chartered Company. Arundell Street, Haymarket	19·6	16·2	17·73
	Chartered Company. Millbank Street	17·6	16·3	16·89
	Imperial Company. Oakley Square, Chelsea	18·6	15·9	16·85
	Imperial Company. Camden Street, Camden Town	16·6	14·8	15·72
	Imperial Company. Graham Street, Dalston	18·6	15·7	16·71
	South Metropolitan, Hill Street	17·6	14·5	15·78
Cannel Gas.	Chartered Company. Millbank Street	27·3	24·0	25·74
	Chartered Company. Arundell Street	27·9	23·0	26·06

These results show that the illuminating power of the gas at each of the testing places has been constantly above the requirements of the Act of Parliament.

As regards purity, Dr. Letheby reports that the gas has been at all times free from sulphuretted hydrogen, and that the maximum, minimum, and average amounts of sulphur in the gas at each place have been as follows:—

Grains of Sulphur per 100 feet of Gas.

	Testing-Place and kind of Gas.	Max.	Min.	Average.
Common Gas.	Chartered Company. Beckton, North Woolwich	48·8	8·6	26·98
	Chartered Company. Cannon Street, City	42·1	10·1	25·77
	Chartered Company. Friendly Place, Mile End	20·2	2·2	8·71
	Chartered Company. Arundell Street, Haymarket	42·7	8·3	18·89
	Chartered Company. Millbank Street, Westminster	30·9	21·7	26·96
	Imperial Company. Oakley Square, Chelsea	37·6	28·1	32·98
	Imperial Company. Camden Street, Camden Town	35·8	21·3	28·16
	Imperial Company. Graham Street, Dalston	32·2	20·9	25·71
	South Metropolitan Company, Hill Street	44·3	24·0	36·05
Cannel Gas.	Chartered Company. Millbank Street	25·2	11·5	18·79
	Chartered Company. Arundell Street	46·9	16·8	29·14

It appears that the amount of sulphur in the gas at Friendly Place, Mile End, has only once been a trifle above 20 grains per 100 cubic feet, and that during the last month the proportion of sulphur in the common gas at Beckton, at Cannon Street, at Friendly Place, and at Arundell Street, Haymarket, has not at any time exceeded 20 grains per 100 cubic feet, the average at the four places having been from 4·66 at Friendly Place to 13·64 at Beckton. Dr. Letheby remarks that these results are highly satisfactory.

The proportion of ammonia in the gas has not at any time exceeded the prescribed quantity of 2·5 grains per 100 cubic feet, the average amount having ranged from *nil* to 1·28 grains per 100 cubic feet.

MAJOR BOLTON'S REPORTS ON THE METROPOLITAN WATERS FOR MAY AND JUNE.

MAY.

During the period embraced in this return, the sources of supply of the metropolitan water companies have been affected by floods from the 16th to 19th of April and from 10th to 15th of May. The state of the Thames water has been very indifferent for about ten days, and the river has been turbid and much discoloured; this discoloration, however, I am informed, is not unusual at this time of the year. The highest level of the river during the month at Ditton was 1 foot 6 inches, and the lowest 2 inches, above summer level; and at Hampton the highest was 9 inches, and the lowest 3 inches, above summer level.

By the direction of the Board of Trade, I made a special examination of the works of the Chelsea Company on the 24th of April, and submitted a report to the effect that the filtering area and reservoir capacity were insufficient, and the point of intake objectionable. This report was forwarded to the company, and a meeting of shareholders was held on the 16th of May, when the directors were authorized to proceed with the following works:—

1. An addition to the present filtering area to the extent of 4 acres, by conversion of the present reservoirs into filter-beds.
2. The removal of the intake from the present site at Seething Wells to a point higher up the river, whereby the outflow of the rivers Mole and Rye will be avoided.
3. A reservoir of large capacity to enable the company, when the river is in good condition, to impound and store water sufficient for several days consumption, and thereby avoid taking water from the river when floods prevail.

It was also resolved to proceed at once with the extension of the filtering-beds, under the company's existing powers; and that application be made to Parliament, in the ensuing session, for powers to carry out the remainder of the proposed works.

The above resolutions embrace the principal recommendations contained in my special report.

The directors of the Lambeth Water-Works Company have instructed their engineer to proceed with drawings, &c., and to obtain tenders for constructing a new reservoir at Streatham, and for covering in the existing one, as recommended in my previous reports.

A nuisance at present exists adjoining the works of the Southwark and Vauxhall Water-Works Company at Battersea, between the north-west filter-bed of the company and the river, on a plot of land the property of the London, Brighton, and South Coast Railway. The nuisance consists of the deposit in this place of the dust, refuse, and stable manure of part of the parish of St. George, Hanover Square, and it is here sifted previous to being placed in barges for transportation. With reference to the water company's works, the nuisance is of a serious character, as when the wind is in a certain direction the pungent dust, thrown up in the process of sifting, must be scattered widely over the water in the filter-beds. The attention of the company has been called to the nuisance, and the vestry clerks of the parishes of Wandsworth and St. George, Hanover Square, have been written to upon the subject, but beyond an acknowledgment of the letter, the company is still without official reply from the vestries.

JUNE.

During the period embraced in this return, the intake of the metropolitan water companies drawing their supplies from the Thames has been much affected by the rains.

The state of the river at Hampton, where the intake of the West Middlesex, Grand Junction, Southwark and Vauxhall Companies is situated, was turbid on the 16th May; it improved on the 17th and 18th, but became thicker on the 19th; from the 20th to the 25th, it fined down and improved, and remained very good from the 26th to the 31st May. On the 1st June it became slightly turbid, and continued in this state until the 11th, when it again became good. From the 12th to the 15th it was good, but slightly coloured with a brown tint. The highest state of the river was 2 feet 11 inches above the 4-feet culvert of the West Middlesex Company, and the lowest 1 foot 9 inches.

At Ditton, where the Chelsea and Lambeth Companies draw their supplies, the river was bad from the 16th to the 25th May, and indifferent from the 26th May to the 15th June, the water being greatly affected by the objectionable outflow of the Mole and Rye. The highest state of the water at this place

was 1 foot 9 inches, and the lowest 2 feet above the (6-foot) summer level. The highest temperature of the water at Ditton during the month was 63°, and the lowest 50°, while the highest temperature of the air at the same place was 73°, and the lowest 40°. These observations are uniformly made daily at 9 a.m. The rainfall at Ditton during May was 3·61 inches, being the highest amount recorded for this month in the last ten years.

The vegetable growth in the filter-beds of the Thames companies has been very rapid during the past month, causing the filters to become quickly choked, and necessitating more frequent cleansing than usual, especially those of the Chelsea Company, which have been cleaned out as often as once a week. The vegetation in the East London filter-beds has also been greater than usual.

BRADFORD CORPORATION GAS-WORKS.

THE PROPOSED INCREASE OF PRICE NEGATIVED.

A Meeting of the Town Council was held in the Court House, on Tuesday, July 9—the MAYOR presiding.

The minutes of the Gas Supply and Smoke Prevention Committee included a resolution as to advancing the price of gas from 3s. to 3s. 4d. per 1000 cubic feet.

Alderman SCOTT, in moving the adoption of the minutes of the committee, said that since the corporation took possession of the gas-works they, or at least the committee, had been met with difficulties that had made him sometimes wish they had never had to do with them. They had inherited a legacy of troubles from the old company in the way of unsettled demands for increased wages, which had come upon them one after another during the year they had had the management of the works. The material they had had to purchase in that time had advanced, and altogether their position had been so bad that the profit left to them upon the manufacture of gas during the year now ended had been reduced about 10 per cent.—that was, in the half year ended the 30th of June last they had realized a less proportion of profit by 10 per cent. than the company did in the corresponding half year in 1871. They had made their contracts for the next year some two or three months since, and got them in for coal at a rate considerably under the present one. They had made all their other purchases as prudently and carefully as they could, and he was sorry to have to inform the council as the result of the position in which they found themselves, from the greatly increased cost of coal, lime, iron, and everything they had to touch in the maintenance of the works and the production of gas, that the cost of the manufacture during the year on which they had now entered, ending the 30th of June, 1873, independent of the previous advance of which he had spoken, would be increased to them by at least 4d. per 1000 feet. His statement was based upon an estimate laid by Mr. Swallow before the committee, as to the increased cost of coal, cannel, lime, the increased cost of ironwork, &c., for repairs, and salaries; and taking off from that increased cost the increased value of tar and coke which they would realize, it left upon the estimated production of gas for the year an increased cost of 4d. per 1000 feet. These figures were most favourable; in fact, they were a sanguine estimate of their position, and he did not think any member of the Gas Committee who knew their position, and who knew the experience of the past year, would believe that they would get off during the next year with an increased cost of 4d. This being proved to the committee, the case for them to consider was whether they would go on as they were, and sacrifice this amount, or recommend to the council that a larger charge should be made for gas. It had been considered, more or less, at two or three meetings, and a special meeting of the committee was summoned to decide upon the question. It was then resolved almost unanimously—he thought there were only two who voted against it—that the price of gas should be increased by 4d. per 1000 feet. Of course, the committee might have left things as they were and sacrificed this amount of profit; but the committee thought that would not be doing justice to the ratepayers, or making a right use of the ratepayers money invested in this concern. The money was invested in the gas-works with a view of making profit, and not with a view of making cheap gas for a few consumers. The ratepayers money was risked in this to some extent. Nobody would say that the £210,000 invested in the gas-works was as secure as if invested in land, or something the value of which could not deteriorate. That being the view of the committee, it was thought they ought to ask for an increased price for gas; that they had no right to run down the profits, but that they had a right to get a fair profit, and a fair return for the money invested, and for the labour—he was going to say the skill—and attention given by the members of the committee to the business of manufacturing gas. He was sorry to find that what the committee had done did not seem to meet with universal approval, though he was sanguine it would meet with the approval of the council. He knew there was considerable opposition to it, but he thought he should only be doing members of the council justice to say that they would at any rate hear what was to be said on the subject before they decided. He was sorry to know that there was an almost organized opposition to this proposal, and that there had been something like canvassing for people to vote against it, whatever the case might be. (Hear, hear, and "No, no.") Somebody said "No, no," but he said "Yes, yes," and he was prepared to prove it. (Cries of "Name.") Of course, what would be said was that the gas consumer would be in a much worse position in consequence of the corporation having bought the gas-works, and that if the corporation had let the works alone they would not have had to pay any more for gas. No doubt it would be a dreadful thing to some people; he was afraid it would ruin them and spoil their balance-sheet for the year. Still, he hoped they would have patriotism and public spirit enough to face the evil. He was not sure that they would not have had to pay more for gas if the works had remained in the hands of the company. (Voices: "It would have been less.") The company were uncommonly clever at manipulating figures and at making out their accounts in a way to suit themselves, and he did not know that they would not have managed to get power to charge more for the gas. It was, however, now too late to raise the question. The council has sanctioned the purchase of the works, and had invested a large amount of money for the sake of making a profit. They had sanctioned, in the bill which had passed through Parliament, powers to charge as high as 4s. per 1000 cubic feet, to give 15-candle gas. If any large gas consumer had any objection to the works coming into the hands of the corporation on such a footing as that, and to the price, then was the time to have stated it, and not now, when the money had been invested, the purchase completed, and they were in the position which they occupied. He should be sorry to have it said that they who where managing the gas-works, and most of whom were considerable gas consumers, were managing them for the purpose of their own private benefit rather than for the benefit of the ratepayers. He was persuaded the ratepayers interest required them to make a fair profit on the money they had invested. They could not do that without making this increase in the price of gas, and it was for the council to say whether they would sanction the increase or reverse what the committee had decided at their meeting.

Mr. G. F. DAWSON seconded the motion for the adoption of the minutes. He expressed his opinion that Mr. Swallow's estimate was more sanguine than the results at the end of the twelvemonth would bear out. He contended that the gas consumers and the ratepayers were not identical parties, and that the ratepayers had a right to expect a fair profit from their money invested in the gas-works.

Mr. WAUD moved that the minutes be approved, with the exception of the resolution proposing an increase in the price of gas, it being the opinion of the council that it is inexpedient to make such an increase. He thought he should be able to recommend his amendment to the council by some figures comparing the relative position of the gas supply in Leeds and Bradford, which he had worked out very carefully. The original cost of the Leeds Gas-Works to the corporation of that town was £880,000, and it was stated before the parliamentary committee that it would cost £160,000 more to put the works in sound and efficient condition. He would, therefore, reckon the cost of the works at a million sterling, though in fact it was £1,040,000. A million at 4 per cent., and a hundred years for redemption, would make the annual charge to the Leeds Corporation £50,000. It was estimated that from 550,000,000 to 600,000,000 cubic feet of gas were produced by the Bradford works in a year; and, considering the different size of the two towns, it was fair to calculate that the production at Leeds would be 1,000,000,000 feet. The capital of the Bradford works was £220,000, and the yearly charge at 4 per cent., with redemption-fund, was £11,000; so that at Leeds gas cost on capital account 1s. per 1000 cubic feet, while at Bradford the cost was only 4.4d. per 1000 feet, and under the company it had been only about 2¼d. per 1000 feet. Bradford, to be in the same position as Leeds, need not charge more than 2s. 10d. per 1000 feet; and he contended that they had no right to extract an improvement-rate from the pockets of gas consumers before beginning to calculate what the gas was really worth. It was not fair to consumers of gas that they should have to pay an improvement-rate equal to the borough-rate in addition to their gas bills. Moreover, it would be very imprudent for Bradford to be the first to throw out the firebrand of an advance in the price of gas among the towns of the country, seeing that the town was situated in a coal district, and was in a favourable position for the production of gas at the cheapest rate. He disputed the idea that Mr. Swallow, who had been financier at the Bradford Gas-Works for a great many years, should be any more sanguine in the estimates he presented to the Corporation Committee than he had been in those which he had made out for the old company. With a comfortable balance of £20,000 in hand, there was no need whatever for the committee to make the proposed advance in the price of gas. He asked for nothing that was not perfectly fair—he wanted nobody to pay his gas bill—but he contended that consumers ought not to be called upon to pay rates for their next-door neighbours, who derived just as much benefit as they did from the improvements in the towns.

Alderman DAWSON seconded the amendment.

Mr. TANKARD wished to know with what idea the corporation had purchased the gas-works. Had they purchased them with the idea of making the gas and supplying it to consumers at cost price? If that was so, he should be prepared to go in for Mr. Waud's amendment; but if not—and he thought it was not so—he should support the proposal of the committee. He urged that it was perfectly right that a rise in the cost of raw material and in wages should be followed by an advance in the price of the manufactured article, and for himself he was quite prepared, as perhaps one of the body of largest consumers, to pay the advanced price.

Mr. HOLDEN said he remembered very well that the statement made by the chairman of the committee, before the gas-works were purchased, held out an inducement to the council and the ratepayers generally that they would realize certain profits; and he went into an elaborate statement as to the amount of profit that had been realized by different gas companies during a certain range of years, showing that the profits had been gradually increasing year by year. The argument in the chairman's statement that had influenced the council most forcibly, no doubt, was that of the probable gradual increase year by year upon the profits which were realized by the company at the time of the sale. No doubt the same argument would be present in the minds of the shareholders of the old gas company, and would help to decide them in fixing upon the figure at which they would sell their concern. He thought if the first step of the corporation immediately after the purchase of the gas-works was practically to reduce those profits very materially by maintaining the same price with an increased cost of production, they would thereby be practically deceiving the ratepayers, who would blame them very much indeed for having purchased a concern on which, immediately after the completion of the purchase, they did not realize what they had held forth as an inducement to the purchase. The advance in the price of gas would affect most considerably the large gas consumers in the borough, and he felt that such being the case, it was only a measure of justice on the part of the corporation to protect the ratepayers generally, which would be done by advancing the price and letting the large consumers take care of themselves. He was a large consumer himself, and certainly it was not a pleasant thing for any of them to pay a high price for any article they consumed; but still he thought they should throw aside any feeling of selfishness in that respect and strive to legislate in the best way they could for the interest of the ratepayers.

Mr. J. HILL thought one point should not be overlooked in deciding upon the question. His intention was to vote against the advance, and he should do so partly because they had no reason to think that coal would continue for any great length of time at the present extravagant price. If the Gas Committee would say that the income would not be equal to the outgo, and there would be a positive loss, he could see good reason for the advance; but so long as it was certain that there would be a considerable profit at the end of the year in 1873, he did not see why gas should be advanced, seeing that in all probability the rise in the price of coal would only be temporary. As a large consumer he for one should be very willing to pay the advance; but he found the opposition to it quite as strong amongst the poorest ratepayers and cottagers as in any other quarter.

Mr. AMBLER thought the fact had not been fairly stated, that even with the price as it was at present they might be able to get 10 per cent. on their outlay.

Alderman SCOTT: No, no.

Mr. AMBLER believed that it was so. But if they got 6 per cent. that would be enough. When the profit got below 6 per cent. he should be quite prepared to pay an advanced price. When a man paid £10 for gas, and £4 of that were spent in street improvements, what amount of reason or justice was there in it when his next-door neighbour, who got quite as much benefit out of the improvements, did not perhaps pay a tenth as much for gas, and therefore, of course, paid only one-tenth as much towards the relief of the rates?

Alderman STOREY said it appeared to him that the chairman and other members of the committee had an undue sense of responsibility in connexion with these gas-works. They seemed to think that in the original prospectus, when they invited the council to take these works into their hands, they promised large profits, which they now felt they were unable to realize. Now he thought the council would entirely acquit them of any responsibility on that score. He was quite sure that from the way in which they had laboured in procuring the Act of Parliament to secure to the corporation these works, and up to the present time, they had deserved nothing but the thanks of the corporation for the intelligence and ability they had displayed. It appeared to him that the great reason why Parliament sanctioned the transfer of these works from a private company to the corporation was that they thought—and in his opinion rightly—that the efficiency of the works would be promoted, and that the town would be better supplied with gas. They thought that the corporation would look at the matter in the way in which matters entrusted to the Boards of Health were looked at, and that they could do what a private company could not do. A private company was always, when an extension was required, looking to the question—Would it pay? That was not the way in which corporations or Boards of Health looked at it. They said—"Is it necessary for the comfort and convenience of the inhabitants, however distant they may be from the centre of the town? Is it necessary they should have

this accommodation? If so, then give them it, and never ask a single question as to whether it will pay or not." They had always considered Bradford as well situated in connexion with coal-fields as any town in the kingdom, and they consequently had a fair right to say that the price of gas in Bradford should be the minimum price that was paid in any other town. He believed they had made up their minds that 3s. per 1000 feet was about as low as was charged anywhere else. They knew that a great many places charged more, but when people consented that these works should go into the hands of the corporation, they never apprehended any advance upon the 3s., and never expected that the committee, whatever their profits, would have reduced the price below 3s. That being the case, and 3s. being proved by the experience of other towns, equally favourably situated, to be the proper price, everything they could make out of the 3s. was fair and legitimate profit. It was a profit which, if the works were in the hands of a private company, would go into the hands of shareholders; but the works being in the hands of the corporation, it fairly and legitimately went to the public advantage. But if they went upon the policy of saying that they would make a profit of 10, 20, 30, or 40 per cent.—and there were towns that did go upon that, which he believed to be an exceedingly fallacious principle, in order to make a large profit, and thereby decrease taxation—they would be putting a special tax upon consumers, a tax which was not put upon any other portion of the community. It was not right—there was no principle of equity or fair play in the imposition of such a tax as that. Therefore he should give his strongest opposition to this increase. If it were required to protect the corporation from loss, he should be glad to vote for an increase of 4d., or of 4s. if necessary, because they were not called upon to carry on that or any other department of the corporation at a loss. But when they had secured to the committee such a price as would protect them from loss, they had no right to impose a single penny of additional cost. He contended that that would be a special tax laid upon consumers for the benefit of other portions of the community, who were just as fairly entitled to pay their due share of the rates. In rejecting the motion he would not wish it to be understood as anything like a vote of censure, for he only thought that the committee, who had hitherto rendered excellent service, had on this occasion committed an error of judgment.

Mr. P. THOMPSON thought the matter was rather one for the mayor, in his capacity as Chancellor of the Exchequer of the Corporation, than for the council to determine. Some two or three months back his worship brought in a budget in which he estimated that certain sums would have to be taken from the gas profits for the relief of the rates. If the advance in the price of material and in wages was such that without a rise in the price of gas the money which had been estimated to come from the gas profits would not be available, then he thought they ought to agree to the recommendation of the committee; but if, on the other hand, the profits were still so large as to admit of the transfer of the estimated sums, in spite of the increase in the price of material and labour, he was of opinion that there was no ground for asking the council to approve of the proposed advance.

Mr. BARBER did not think the council would be justified in increasing the price of gas to a higher figure than it was when they bought the works, till it could be shown they were carrying on the manufacture at a loss. He pointed out that the proposed increase in the price, if expended, as it would be, in town improvements, would really benefit the people outside the borough boundaries at the cost of large consumers within the borough.

Mr. IBBETSON would like to ask one question of the chairman of the committee. He had not said a single word as to whether there would be any improvement in the quality of the gas. He thought that the price they were paying was quite high enough for the quantity and quality of the gas at present supplied.

The MAYOR said it must be borne in mind that 2s. 6d. in the pound was the outside general district-rate they could get. That 2s. 6d. rate was already mortgaged and expended. In fact, the corporation could not pay what they had to pay out of that rate this year, and they were obliged to take £4500 out of the gas profits in order to make it up. If gentlemen would just consider the sanitary requirements and street repairs of the borough, they would see that they could not do with a 2s. 6d. general district-rate. The question was, did the corporation buy the works with the intention of benefiting the gas consumers, or with the intention of charging a fair and reasonable price, and with the profit doing something for the improvement of the borough? He said that undoubtedly no member of the council would have gone for the purchase of the gas-works, if it had been intended simply to benefit the gas-consumers, and let them have the gas at cost price. He contended that the gist of Mr. Waud's argument and figures, with reference to Leeds, was that because Leeds had made a bad bargain, and Bradford had made a good one in the purchase of the gas-works, the large consumers were to have the gas at a low price.

Mr. WAUD: No, no.

The MAYOR believed that the majority of the council would have understood Mr. Waud's remarks in that sense. It never was the intention of the corporation to give these profits to the consumers, and if they did so, as soon as they got any profit from the water they would have to deal with it in the same way. The result would be that they would have to go to Parliament to ask for power to increase the general district-rate.

Mr. WAUD: I say that is quite fair.

The MAYOR said it was monstrous that the consumer should have the gas at cost price, and that the ratepayers should be charged increased rates in consequence. It was fair and reasonable that the price of gas should be as equal as possible in different towns, if competition was to be carried on upon equal terms; and he believed that the argument was entirely in favour of keeping up the price of gas at a legitimate and fair sum, having regard to the cost of materials, and leaving those gentlemen on the committee who managed the works for the benefit of the town to employ the profits for public improvements.

Alderman COLE contended that, compared with the price of gas in other towns, 3s. 4d. was a fair and reasonable price to pay, and that the large consumers were the best able to pay the advance. He hoped the council would almost unanimously approve the proposition of the committee.

Alderman M. DAWSON trusted the council would almost unanimously reject it. They would all admit that the gas-works had not been purchased for the benefit of gas consumers, but neither were they purchased for the detriment of gas consumers. The council had no right whatever to tax one class of the community for the benefit of another class. He did not believe in indirect taxation, because it was generally unjust, and in cases such as this it would have a tendency to promote extravagance. He thought it was always better that the ratepayers should know how much they paid, so that they might watch more carefully how it was expended. What would be the effect of an increase in the price of gas? As at Halifax, the large consumers would make their own gas. Something had been said about the price paid for gas in other towns; but with that they had nothing to do. In Halifax a larger price per 1000 gallons was charged for water than was charged in Bradford, and the result was that manufacturers were encouraged by the cheapness and excellence of the water supply here to establish works which otherwise might be taken to Halifax. The cheaper they could make these articles of large consumption the more they would foster manufactures and benefit the working classes and the community at large.

Alderman BRAYSHAW said that so far as he could judge neither the chairman of the committee nor the mayor had made out any case whatever for the advance; and he believed it would be one of the greatest mistakes the council ever made if they entertained the proposition. Why had it been brought forward? The cat had been let out of the bag. It was to enable members who were so disposed to go in for any degree of reckless expenditure in carrying out improvements which were not wanted. He thought the council ought to be very thankful that the district-rate was limited to 2s. 6d.

Mr. WAUD replied on the amendment. He said he might state that before the corporation began their negotiations with the gas company the question came for consideration before the directors of the company whether they should not reduce the price of gas to 2s. 6d. per 1000 feet. He believed there would have been no alternative but for the old company to make the reduction to 2s. 6d.; and he was quite sure they would not have been able to induce the magistrates, with any figures they could have brought before them, to sanction the advance on 3s. Why were they taking the works from the company to advance the price to 3s. 4d? If the mayor wanted an improvement-rate of threepence or fourpence, let him have it, but why should he want to establish a tax that would only fall upon one here and there? No reason had been shown why the corporation should increase the price of gas by 10 per cent. or by 25 per cent. above the price which it would soon have reached if the works had remained in the hands of the old company. He did not want them to make it at a loss; but he had no doubt whatever there were plenty of gentlemen who would be ready to execute a bond to take the works off the hands of the corporation now, and supply the gas at 3s. per 1000 feet.

Alderman SCOTT, in reply on the motion, said he wished to inform Mr. Waud that if the advance took place, Bradford would not be first to throw out the firebrand—as Mr. Waud had phrased it—of an advance. The authorities at Wakefield had had the subject under consideration, and had already resolved to advance the price from 3s. 2d. to 3s. 8d. per 1000 feet. At Carlisle, Huddersfield, Preston, and other towns the subject was still under consideration, and as far as he was informed it was probable that the price would be advanced there. As he understood, the Bradford Gas-Works had been bought to make a profit, and it was important to know whether they were to be carried on to make a profit or for the benefit of gas consumers. If the arguments in favour of the latter course were good for anything, not only ought they to keep the cost at 3s., but actually to reduce it to cost price. He reviewed some of the arguments employed by the opponents of the resolution, and in conclusion hoped the council would not be frightened by the bugbear that was always brought before them on these occasions of "a strong feeling out of doors."

The council then divided, when there appeared—

For the amendment	24
Against	11
Majority for	13

The resolution to increase the price of gas was therefore negatived.

OPENING OF THE NEW OFFICES OF THE LIVERPOOL UNITED GASLIGHT COMPANY.

The staff of the Liverpool United Gaslight Company entered upon the occupation of the new offices erected in Duke Street for their accommodation, on Monday, the 1st of July. The advance of the company's prosperity has been in a ratio equal to the increase of the town in population and extent, and, as a consequence, various changes of local habitation have been rendered necessary in the course of the many years that have elapsed since the company was formed. The building just completed, however, is so spacious, and so perfect in its arrangements, that the business of the company must increase very rapidly indeed if the accommodation which it affords proves unequal to the demands that may be made upon it during very many years to come. As an addition to the architectural features of the town, the new gas offices command notice, as both exteriorly and interiorly they are designed so as to unite in a very high degree boldness and beauty of architecture with thorough adaptability to the purposes for which they have been constructed. It is all the more a duty to note the architectural merits of a building which forms, perhaps, the finest public offices in the town, that it was designed by the late Mr. Lucy, of Liverpool, assisted, we believe, by Mr. Henry Littler, of Manchester. Mr. Lucy died before much progress had been made with the building, and since then the work of construction has been superintended by Mr. Littler, in the interests of the widow of his deceased friend.

The new building is situated with its principal entrance opposite to Colquitt Street. The style of its architecture is Renaissance Italian of a French character. The building comprises, on the principal or ground floor, a general office, 65 feet by 75 feet, placed at the rear of the building, lighted on three of its sides by large, lofty windows, and, in addition, by a dome-light over the centre of the room. This office is intended for the transaction of general business with the public, and access to it is obtained from the principal entrance. The general office is fitted up with a range of counters on the two sides and at the end opposite the public entrance, the centre part of the room being intended for the public use as a waiting-hall, whilst the space behind the counter is fitted up with desks and seats for upwards of 100 clerks, collectors, and other officials. Contiguous to the general office, and placed conveniently for access from the chief entrance, is the manager's private office, adjoining which, within the general office, is the office of the chief clerk and his assistants. In the basement beneath the general office are two large strong rooms fitted to receive the books and cash safe, &c. An hydraulic hoist is provided to raise and lower the books, safes, &c., to and from the general office to the strong rooms. There are also beneath the general office a cloak room, extensive lavatory accommodation, large stores for fittings, and a kitchen and dining-room for clerks. The whole of the basement of the building is well lighted by external windows which open into wide areas, affording means of access from the yards and workshops to the basement offices and the dining-rooms, &c. The front part of the building comprises a basement storey containing offices and store-rooms. On the ground floor are two show-rooms for fittings, one on each side of the main entrance, with a corridor of communication and manager's rooms. From the corridor access to the yard is obtained at each end of it, and the chief staircase to the board-room and engineer's offices on the floor above is approached from the entrance-hall. A workmen's staircase is also placed in this part of the building, from the basement to the upper floor, near the engineer's office. On the first floor are the board-room, ante-room, engineer's office, and engineer's clerks drawing office and plan room, forming a suite of rooms the extent of the Duke Street frontage, and behind these rooms is a corridor of communication; from the corridor, access is obtained to the staircases, and a photometer room and engineer's room for experiments. Above the suite of rooms last described is an attic storey to be used as stores and offices, and for storage of books and documents. The building has a frontage towards Duke Street of over 120 feet; the depth from front to back is nearly the same. The Duke Street front and its two flank return walls are built of Cefn stone. The front comprises a central portico in coupled fluted columns, with responds, and a flight of six steps to the main entrance door. The building has its ground floor about four feet above the street level at the centre. The wing walls to the steps cross the area towards Duke Street, and the area is divided from the street by a parapet wall and balustrade, with handsome gas pillars and lamps on the chief piers. Above the basement, the front is divided horizontally into two orders, or stages, each having continuous surbase and dado, &c., and entablatures, the upper order being surmounted by a bold cornice supported on consoles, which are accentuated over the pilasters by being repeated there. Above the main cornice is an open balustrade parapet, broken in the centre by a large Dormer

window, carried to the height of the main ridge, and flanked by shafts on the pedestals. Similar shafts are placed on the angles of the parapet, and they contain flues for ventilating the different rooms. The ground floor has, on each side the entrance, four square-headed windows, with boldly moulded architraves, divided by pilasters, the intermediate wall piers being rusticated. The base and entablature of the pilasters are continued along the front and flank walls, and thus mark out the ground storey. The division of the first floor is similarly arranged—its windows have semicircular archivolts, enriched by carving. The circular heads are filled in solid by panelled stone tympana. The centre window over the main entrance is similar in character, with side light, forming a Venetian window. The capital of the fluted pilasters of this storey serve as imposts to the archivolts, and a moulded and carved string corresponding with them is continued on all the wall piers of the front and flank of the building, and the pilaster dado and base are similarly continued, excepting that in the window openings the dado is filled in with balusters. The same line of base is broken round the portico in the form of a balustrade with pedestals and terminals at the angles, forming a parapet to the flat over the portico, which may be approached from the central window, which opens to the floor. The building is of a substantial character, and with the exception of the Duke Street front and its flank no attempt at embellishment has been made to the exterior of the building. Internally, the general office is a fine room, with a richly panelled ceilling divided into compartments by moulded beams in plaster work. The centre and largest panel has within it a dome 17 feet diameter, filled with stained glass divided into sections by ornamented ribs. The drum of the dome is richly panelled, and busts of life-size figures are placed beneath the ribs of the dome, which springs from the flat of the ceiling by an enriched cove. A ring of triplet gas jets encircles the dome at its base. The ceiling is supported by eight Corinthian columns of polished stone, fluted, each with its pedestal 26 feet high placed beneath the junctions of the main ceiling beams in couples, and on the walls are corresponding pilasters. The windows on the three sides of the room have circular heads, and their arches spring from a continuous enriched impost moulding. The desks, counters, and other fittings are of oak of a serviceable character, and in design to accord with the style of the building. Each desk is in communication with the manager's office by a bell signal on the atmospheric system. The apparatus was furnished and fitted by Messrs. Barr, of Leeds. The painted decorations of the room, and of the building throughout, are purposely of a quiet subdued character, and subordinated to the purpose for which the building was designed. The floors of the halls and corridors are of tiles. The building is heated by warm water, the apparatus being furnished and fixed by Mr. J. Combe, of Glasgow. The architects received much valuable assistance in the general arrangement of the offices and fittings, from Mr. King, the engineer to the company, and from Mr. Crosby the manager.

THE INSTITUTION OF CIVIL ENGINEERS.

The Council of the Institution of Civil Engineers have just awarded the following premiums for papers read at the meetings during the session 1871-72:—

1. A Telford medal, and a Telford premium, in books, to Bradford Leslie, M. Inst. C.E., for his "Account of the Bridge over the Gorai River, on the Goalundo Extension of the Eastern Bengal Railway."

2. A Telford medal, and a Telford premium, in books, to Carl Siemens, M. Inst. C.E., for his paper on "Pneumatic Despatch Tubes: the Circuit System."

3. A Telford medal, and a Telford premium, in books, to William Bell, M. Inst. C.E., for his paper "On the Stresses of Rigid Arches, Continuous Beams, and Curved Structures."

4. A Telford medal, and a Telford premium, in books, to John Herbert Latham, M. Inst. C.E., for his description of "The Soonkêsala Canal of the Madras Irrigation and Canal Company."

5. A Telford medal, and a Telford premium, in books, to George Gordon, M. Inst. C.E., for his paper on "The Value of Water, and its Storeage and Distribution in Southern India."

6. A Telford premium, in books, to Frederick Augustus Abel, F.R.S., for his paper on "Explosive Agents applied to Industrial Purposes."

7. A Telford premium, in books, to Bashley Britten, for his paper on "The Construction of Heavy Artillery, with reference to Economy of the Mechanical Forces engaged."

8. The Manby premium, in books, to Charles Andrews, M. Inst. C.E., for his paper on "The Somerset Dock at Malta."

The Council have likewise awarded the following prizes to students of the institution:—

1. A Miller prize to Oswald Brown, Stud. Inst. C.E., for his paper on "Sewage Utilization."

2. A Miller prize to Arthur Turnour Atchison, B.A., Stud. Inst. C.E., for his paper on "Railway Bridges of Great Span."

3. A Miller prize to John Addy, Stud. Inst. C.E., for his paper on "The most suitable Materials for, and the best mode of Formation of, the Surfaces of the Streets of Large Towns."

4. A Miller prize to Alfred Edward Preston, Stud. Inst. C.E., for his paper on "Wood-Working Machinery."

5. A Miller prize to William Patterson Orchard, B.E., Stud. Inst. C.E., for his paper on "The Education of a Civil Engineer."

DR. STEVENSON'S REPORT ON THE GAS SUPPLIED TO ST. PANCRAS DURING THE MONTHS OF MAY AND JUNE.—During the month of May the gas supplied by the Imperial Company had an average illuminating power of 14·2 standard sperm candles, as determined by Letheby's photometer. The illuminating power was lower than that of any month during the current year except February; the highest illuminating power was 15·1, and the lowest 13·5 candles. Of impurities, ammonia was invariably present, though never in excessive quantity. Sulphuretted hydrogen was never detected. Sulphur, in various forms, was present to the extent of 23·34 grains per 100 cubic feet; this is about the usual quantity of sulphur present.—During the month of June the average illuminating power of the gas supplied to this parish by the Imperial Company at the testing station, 10, Edward Street, was 14·0 standard sperm candles, the maximum being 14·6, and the minimum 13·2 candles. The testings were made, as usual, according to the instructions of the Metropolis Gas Act, 1860. Tested by the gas referees apparatus, the average illuminating power would be 16·2, the maximum 17·0, and the minimum 15·4 candles (calculated). It will thus be observed, that on every occasion of examination the gas conformed to the requirements of the statute as regards illuminating power. The illuminating power of the gas was a little below the illuminating power during the month of May. Of impurities, ammonia was always detected, though never in large amounts. It is expected that very shortly this impurity will be entirely removed from the gas supplied by the metropolitan companies. Sulphuretted hydrogen was never present. Sulphur, in forms other than that of sulphuretted hydrogen, was present to the extent of 18·4 grains per 100 cubic feet—a satisfactory decrease as compared with the amount found in the preceding month. After the 30th of September next the amount will not be allowed to exceed 30 grains per 100 cubic feet measured by the gas referees apparatus, or 26 grains as tested by the Letheby apparatus furnished to me. I beg to direct the attention of such of the vestrymen as are interested in the present agitation as to the purity of gas to a parliamentary paper, No. 199 of the present session, being a return made to two orders of the Commons House, and relating to copies of correspondence between the Gas Committee of the Corporation of the City of London and the Board of Trade, &c., and of correspondence relative to the quantity of sulphur, &c., and report on sulphur purification. This paper can be procured for 11d., and affords much valuable information. THOS. STEVENSON.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN JUNE, 1872:—

JUNE, 1872.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	June, 1871. 0°	June, 1872. 0°	June, 1871. 0°	June, 1872. 0°	0°
Distilled Water . . .					
West Middlesex water .	17·24	17·31	0·74	0·68	0·000
Grand Junction water. .	17·45	17·54	0·76	0·72	0·001

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During the month the water of both companies was clear and bright: in the past week the water of the West Middlesex Company exhibited a degree of brightness, transparency, and freedom from colour which I have scarcely ever before observed.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN JUNE, 1872:—

JUNE, 1872.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 22 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . . .	16·33	17·30	15·70	26·06	9·03	28·70	1·00	None.
Chartered Company's common gas	16·51	17·20	15·80	39·40	16·06	23·05	0·58	None.
Chartered Company's cannel gas	23·76	24·40	23·00	33·21	14·72	27·02	1·01	None.

Mean of daily readings of barometer . . . . 29·82
" " " thermometer . . . 68·07

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

During the month the mean illuminating power of the Imperial Company's gas was equal to the light of 16¼ candles, and it ranged between 17·30 and 15·70 candles. The mean quantity of sulphur found in 100 cubic feet of this gas was 28·70 grains, and of ammonia 1 grain. The mean light of the Chartered common gas was equal to 16½ candles, and ranged between 17·20 and 15·80 candles; the quantity of sulphur found in it was 23·05 grains—a vast reduction from the mean quantity of this impurity during the last 18 months; the ammonia amounted to rather more than half a grain. The mean light of the cannel gas was equal to 23·76 candles, and ranged between 24·40 and 23·00 candles; the sulphur amounted to 27 grains, and ammonia to one grain. On no occasion was sulphuretted hydrogen detected in either of the gases. The pressure of all was generally good. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas, manufactured at their works, Horseferry Road, Westminster.

PRICE OF GAS AT HEYWOOD.—After a warm discussion in the local board of Heywood, on Wednesday last, it was resolved that the price of gas for consumption up to 50,000 feet should be 4s. 3d.; from 50,000 to 100,000 feet, 4s. 2d.; and above 100,000 feet, 4s. 1d. per 1000 feet, without discounts. This is a small rise on former prices.

STOKE-ON-TRENT GAS COMPANY.—On Tuesday last, the half-yearly meeting of the proprietors was held—Mr. C. M. Campbell presiding. Mr John M'Millan, the new secretary and manager, having read the notice calling the meeting, the chairman read the half-yearly report, which was of a very satisfactory character. A dividend of 5 per cent. for the half year was declared. It was stated that the company had entered into a contract with the North Staffordshire Railway Company for ten years, to supply the company with gas.

TRANSFER OF THE BOLTON GAS-WORKS TO THE CORPORATION.—A meeting of the Gas Committee was held on the 1st inst., when the following resolution of the directors of the Bolton Gas Company was read:—"That subject to the provisions of the Bolton Corporation Act, 1872, the directors of the Bolton Gas Company are willing that the management of the gas-works shall, on and from this day, be undertaken by the corporation, the directors being indemnified by the corporation against any liability in consequence thereof; and that upon this resolution being concurred in by the Gas Committee of the corporation, the management of the works be transferred to them accordingly." It was resolved "That the committee concur in the resolution of the directors of the Bolton Gas Company, and accepts the management of the gas-works in accordance thereto." Councillor Holden was appointed vice-chairman of the committee, and it was resolved that a list of the officers and servants now employed in the gas undertaking, with their respective duties and salaries or wages, be prepared under the direction of the manager of the works. It was decided that a meeting of the committee should be convened to take place on the following Thursday, at 10 a.m., to view the lands, building, and works appertaining to the gas undertaking. It was resolved that a schedule be prepared, under the direction of the sub-committee, of all land, buildings, and stock appertaining to the gas undertaking. Alderman Skelton and Smalley and Councillor Kevan were appointed a sub-committee, to make the requisite arrangements for the preparation and issue of the annuity certificates, bonus mortgages, and keep a register of the annuitants and mortgagees and a transfer register. The borough treasurer was authorized to pay in cash bonuses due to any shareholder of the gas company, notwithstanding the total amount thereof exceeds £50.

APPOINTMENT OF A GAS MANAGER AT MIDDLESBOROUGH.—At the last meeting of the Middlesborough Town Council the Gas Committee recommended the appointment of Mr. Booth, late manager of the Staleybridge Gas-Works, as new gas manager, at the salary of 250*l.* per year. This was agreed to, and on the motion of Mr. Councillor Dunning, it was resolved to place a photometer in the house of the public analyst, Mr. Hudson, so that he might test daily the quality of the gas supplied by the corporation.

GAS AGITATION IN BORDEAUX.—The rage for the acquisition of gas undertakings by municipal authorities is spreading to the Continent. A meeting of the Municipal Council of Bordeaux was held on the 18th of March, at which it was unanimously resolved that the municipality should commence the manufacture of gas on Jan. 1, 1876. At the same time the mayor was authorized to treat with the Imperial Continental Company for the acquisition of their undertaking; and, if necessary, to advertise for plans for the construction of competing works.

GAS SUPPLY OF HULL.—Mr. Baynes reports that the quality of the gas supplied by the British Gas Company to the district of Sculcoates and Myton, during the month of June, was satisfactory, both for illuminating power and chemical purity. During the past half year 92 examinations of the gas were made for light-giving power, its mean value being 14·85 candles. In the same period, exclusive of the ordinary tests for free ammonia and sulphuretted hydrogen, from which the gas was always free, 29 quantitative analyses were made for chemical purity; the sulphur compounds averaged 26 grains per 100 feet of gas, the fixed ammonia 1 grain per 100 feet. The photometric experiments were made, as usual, with Sugg's 15-hole standard burner, which gives a lower illuminating power by nearly 2 candles than the burner now used in London for testing gas. The results for June and the six months are:

	Max.	Min.	Mean.
Illuminating power standard sperm candles . .	14·80	14·34	14·64
Six months	15·28	14·49	14·85
Grains of sulphur per 100 feet	26·40	24·40	25·08
Six months	26·86	25·38	26·11
Grains of ammonia per 100 feet	—	—	0·50

Mean barometer and temperature in experiment room:

	Bar . . 29·92	Temp. . .	66.
Six months . .	29.85		58.

PROPOSED PURCHASE OF THE HECKMONDWIKE GAS-WORKS BY THE LOCAL BOARD.—At the meeting of the board on the 1st inst., Mr. G. Burnley, the chairman, stated that a short time ago the clerk was instructed to write to the gas company relative to the purchase of their works. He had to submit to the board a resolution passed unanimously by the gas company's directors. It was as follows:—"That whilst the shareholders of the Heckmondwike Gas Company would have greatly preferred retaining the works in their own hands, believing the business to be a sound and profitable one, they are willing to dispose of the said works and plant to the Heckmondwike Board of Health, provided that a fair and reasonable price be given for the same, based on the commercial results of the undertaking, and considered as an increasingly prosperous going concern." After some discussion, it was resolved to constitute a committee of the whole board (except those interested in the gas-works), to negotiate for the purchase of the gas-works. In accordance with the notice given at a previous meeting, the chairman moved "That the board make application to Parliament next session (1873) for an Improvement Act for the district of Heckmondwike, and that a committee be appointed to consider what it may be desirable to include in such application to Parliament, and to report thereon to the board." Mr. J. Firth seconded the motion, and it was agreed to.

TRANSFER OF THE DEWSBURY AND BATLEY GAS-WORKS.—At the meeting of the Dewsbury Town Council, on Tuesday, July 2, the corporate seal was affixed to an agreement between the corporations of Dewsbury and Batley for the compulsory purchase of the Dewbury and Batley Gas Company's Works, &c., it being intended to apply to Parliament for a bill to enable the purchase to be carried out, and that the two corporations shall remain partners for not more than five, nor less than three years. On separation, Batley will take the works at Soothill and supply her own borough; and part of Soothill Upper and Dewsbury will take the rest of the district at present supplied by the company.

SERIOUS EXPLOSION ON A STEAMER.—On Tuesday last a serious explosion occurred on board the screw-steamer *Torino*, of Geneva, lying at Tyne Docks, South Shields. The vessel was loading gas coals, and the cook and two seamen went below to get some provisions, carrying with them a lighted candle. They no sooner got below than a terrific explosion took place from the gas generated from the coals. The men were knocked down and dreadfully burned in all parts of the body. One of them is not expected to live. They were conveyed by special train to the Newcastle Infirmary. On the explosion taking place the steamer took fire, which was extinguished by means of the water hose. The steamer is considerably damaged by the casualty.

GAS EXPLOSION AT THE BRUNSWICK HOTEL, SHEFFIELD.—On Wednesday afternoon, July 3, an explosion of gas took place at Mr. Bland's, Brunswick Hotel, Old Haymarket. On the second floor is an apartment used as a store-room by Mr. T. W. Simmonds, commercial traveller. That gentleman, in consequence of the smell of gas, opened the bottom sash of the window. The boots at the hotel came into the same apartment with a lighted piece of paper, and a loud explosion was the immediate result. A partition wall between the room and a water-closet was forced down, and the window blown out, and the furniture and fittings considerably damaged. Mr. Simmonds and "boots" were both burnt about the hands and face. The former was at once attended by Dr. Thomas, and the latter was removed to the Public Hospital. It was thought at first that the premises had caught fire, and the Corporation Fire Brigade were promptly in attendance with their engine, but their services were not required. The damages are under £100.

BREAKING STREET LAMPS.—At the Lambeth Police court, last week, Edward Temple, 24, well-dressed, was charged with wilfully breaking a street lamp at Clapham. A police-constable saw prisoner at 4 o'clock on Wednesday morning raise his umbrella and thrust it through the glass of a street lamp. He told the constable he had no reason for acting as he did, and that he had done it for a "lark." Mr. Sydney Drane, from the Phœnix Gas Company, stated that there had been hundreds of lamps damaged at night, and the offenders were seldom detected. The damage done was great, and many complaints were made of lights being extinguished. He asked, on the part of the company, for a penalty under the Act, which gave the magistrate power to inflict a fine of £5. Prisoner's excuse was that he had been to a dinner-party and broken the lamp for a lark. Mr. Ellison told him that those who indulged in such larking must pay for it. He ordered prisoner to pay a penalty of £2 and the amount of damage, or, in default of payment, to undergo three weeks imprisonment.

CONVICTION FOR PUMPING GAS-TAR INTO A RIVER.—On Wednesday last the Corporation of Congleton, who are the owners of the gas-works in that town, were summoned to the borough police court under the 21st section of the Gas Works Clauses Act, 1847, for polluting the river Dane. Mr. G. W. Reade appeared to prosecute, and called Daniel Thompson, managing mechanic to Messrs. Pearson's mill, who said that on the Thursday forenoon previous he saw a quantity of gas-tar floating on the river Dane, from where it receives the brook Howtey, backing up to the weir. He had seen it several times since. There was a new tank being constructed, and tar and water had probably got into the river by being pumped out of the tank. The contractor for the work was seriously ill. Mr. Blackshaw, the borough surveyor, proved that on Saturday last he found gas-tar had been pumped out of the new tank along to the water that had been flooded with it. He spoke to the gas manager, who stopped the pumping. The nuisance might be easily obviated. Mr. Reade here intimated that he would not press for a conviction under the Gas Act, which imposed £200 penalty, but take the case under the Nuisance Removal Act; thereby the justice of the case would be met. The ex-Mayor, who presided, said that it was a very proper application on the part of Messrs. Pearson, who had taken a most lenient course. The Bench then made an order for the non-recurrence of the nuisance.

FATAL ACCIDENT AT THE NEEPSEND WORKS OF THE SHEFFIELD GAS COMPANY.—A shocking accident occurred on Monday, July 1, at these works, by which the life of one man was sacrificed, and two other men received such injuries as laid them low, and in a position of great danger. The gas company are building a large chimney, which has at present reached the height of upwards of 50 yards, and at the time of the accident Matthew Shepherd, a contractor, John Goldsbury, a bricklayer, and George Henry Connor, an apprentice, were with several others building at the top of the chimney. The men are drawn up and let down by means of a windlass fastened into the ground, and about one o'clock on Monday afternoon—the dinner hour—the men were being let down. Two of them reached the bottom safely. The three others followed, but they had not proceeded far before an accident happened to the windlass, and they were precipitated to the bottom with terrific force. All of them sustained very serious injuries, more especially Goldsbury and Connor; the former, besides having his right leg fractured, sustained a dreadful injury to his abdomen. Connor, who is only a youth, had both legs fractured. Goldsbury succumbed to his injuries late the same night, and an inquest on his body was held on Tuesday afternoon. The inquest was adjourned for a fortnight, the other two men being in a critical state.

EXPLOSION OF GAS AT WENTWORTH HOUSE.—An explosion of a somewhat alarming character took place on Tuesday, July 2, at Wentworth House, the residence of Earl Fitzwilliam. It appears that about nine o'clock on Tuesday morning some of the servants at the house discovered that one of the gas-pipes in the cellars was leaking. Shortly after one o'clock, Mr. Joseph Woodward, master plumber, of Wentworth, and a man named Henry Greenwood went to the house in order to stop the leakage. The first thing they did was to turn the gas off at the meter, and about twenty past one o'clock the two men repaired to the cellars in order to discover the defect in the piping. They had scarcely been gone five minutes when a loud report echoed through the house, to the great alarm of many of the servants. A number of them rushed towards the cellars to see if the plumbers were injured, and they were somewhat reassured on hearing Woodward call out that he was not much injured, and was coming out. A party of them then proceeded to explore the cellars, and they soon found Greenwood, who for a time had been rendered insensible. It was afterwards ascertained that the two plumbers had gained the cellars in safety, and Woodward had mounted a pair of steps at the part of the cellar immediately under the main entrance of the house, to try and find out where the gas was escaping. He says the gas smelt very strong, and there must have been a great accumulation at the top of the cellar. Greenwood had a candle and matches with him, but Woodward cannot say positively that he struck a light. However this may be, the gas exploded, and Woodward was thrown to the ground. He was scorched about the face, head, and neck, and he received several bad bruises by his fall from the steps. Greenwood was more severely injured. His face, neck, and head were much burnt, and his hair and whiskers were burnt off. Besides these injuries his left hand and wrist were scorched, and the fire seems to have run up his right sleeve and to have burnt his arm. He was thrown violently to the ground, and part of a door, which was destroyed, was thrown upon the top of him. The gas which supplies the house is manufactured by Earl Fitzwilliam at a small works situate only a short distance from the house.

LIGHTING THE HOUSES OF PARLIAMENT.—A return "of the total quantity, and cost, and illuminating power of the gas consumed at the Houses of Parliament during the last year, distinguishing the quantity and cost of the gas consumed in each of the private residences at the Houses of Parliament during the same year;" and "of the total cost of lighting by oil lamps in the private residences at the Houses of Parliament during the same year;" as well as a "statement showing any changes that may have been made in the illuminating power of the gas supplied to both Houses of Parliament, and any alteration in the number of burners since the 1st day of January, 1866," has been made on the motion of Mr. Rylands. From this it appears that the quantity of gas consumed at the Houses of Parliament and the private residences during the year ending the 31st of December, 1871, was 12,509,000 cubic feet, and the cost £3387 17s. 1d. The cost of the oil consumed in private residences during the same period was £253 13s. 7d. As regards the alteration in the quality of the gas, the first Commissioner of Works gives the following information:—From January, 1866, to January, 1870, the lowest illuminating power of the cannel coal gas supplied to the Houses of Parliament was what is known as 20-candle gas; but before 1866, and up to about 1868, the gas was richer by several candles. From the latter date the quality of the gas was reduced by the company, though not lower than that specified as the minimum in the contract between the Office of Works and the company. On account of this reduction in quality, it became necessary to consume more gas in order to produce the same quantity of light as previously; and, accordingly, to replace the burners in both Houses of Parliament by others suitable for such increased consumption. In 1870, the standard illuminating quality of cannel coal gas was fixed by the gas referees, appointed under a recent Act of Parliament, at a minimum of 23 candles, and the price at 5s. 6d. per 1000 cubic feet; and since that period 23-candle gas has been supplied to the Houses of Parliament, the company taking care not, as formerly, to furnish gas having a considerably higher illuminating quality than that specified as the minimum in their contract. The price now charged for gas consumed at the Houses of Parliament is 5s. 5d. per 1000 cubic feet. The changes made in the burners have been as follows:—Since 1866, 131 lamps have been fixed in New Palace Yard and its approaches, 60 lights in the new dining rooms, and 1 cooking-stove in the new kitchens, 1 toaster in the tea room, and 6 ring burners, and 1 cooking stove *in other parts*, making a total of 301 additional burners.

HALIFAX WATER SUPPLY.—The Water Works Committee have decided to issue a notice to their customers that, owing to the very full condition of the corporation reservoirs, all restrictions upon the use of the water are removed.

CADIZ WATER-WORKS COMPANY.—The announcement is made in our advertising columns of the issue of 20,000 preferred shares of £10 each in this company, bearing 10 per cent. dividend ultimately, and upon which interest at the rate of 7 per cent. is payable during the construction of the works. The town and port of Cadiz are very unsatisfactorily provided with water at present, and the attempts to procure an adequate supply in the neighbourhood have failed. A concession was recently granted by the municipality to bring water into the town from the springs of La Piedad, and this concession, which is for 99 years, with the works already executed, the lands, and the caution-money, have been transferred to the company for £40,000 in cash and £50,000 in ordinary shares. The net annual revenue is estimated at £49,420, out of which 10 per cent. interest is to be paid on the preference shares now offered, and the interest on £100,000 debentures proposed to be issued when one-half the works are executed.

SUPPLY OF WATER TO LAMBETH.—At the meeting of the vestry of this parish on the 4th inst., Dr. M'Cormack, the medical officer, reported that on the 18th ult., he examined the water supplied to this district by the Lambeth and Southwark, and Vauxhall Water Companies, with results showing that there was this month a very slight improvement in the water supplied by the Lambeth Company; but that of the Southwark and Vauxhall continued to exhibit the same degree of impurity as it did the previous month. Living organisms were detected by the microscope in both waters, and in the bottle of Lambeth water some animalculæ were found which were visible to the naked eye. Dr. M'Cormack stated that he had had a drawing made of one of the animalculæ found by him in the Lambeth water, magnified 100 times, which, though not positively injurious to health, was not pleasant to drink. The specimen was that of the "water scorpion."

WATER SUPPLY OF SOUTH LONDON.—At the last meeting of St. Olave's District Board of Works, a discussion took place in reference to complaints on the water supply in this district which had been referred to the law clerk to see what power the Board of Trade had to compel the Southwark and Vauxhall Water Company to give a proper supply. The report of the clerk was

read. After pointing out that the Board of Trade had power to force the Water Company to supply a proper quantity, on a requisition signed by 20 persons being received, the clerk gave it as his opinion that this board, in its corporate capacity, had no power over the water company. Dr. Vinen, the medical officer, read his report having reference to the same subject, from which it appeared that complaints had been received from 59 occupiers, which complaints, in all cases, arose from want of pressure. During the last week, however, the supply had much improved, and was now quite sufficient. It was decided that an abstract of the clerk's report be entered on the minutes.

WATER SUPPLY OF OLDBURY.—At the meeting of the local board, on the 5th inst., the medical officer (Mr. Hayward), called the serious attention of the board to the very defective supply of water to the township. He had long ago pressed the board to compel landlords to supply their tenants with good drinking water, and that would have been done had it not been for the unsatisfactory supply, both as to quantity and quality, of the South Staffordshire Water-Works Company. He thought it was high time the board took the subject up in a determined manner, and dealt with the company as the Dudley Town Council had. Mr. Yeomans proposed that the water-works company should be prosecuted for the non-supply of water, which was seconded by Mr. B. T. Sadler, and carried unanimously.

NORTH SHIELDS WATER COMPANY.—The annual meeting of the shareholders of this company was held on the 1st inst.—Dr. Bramwell in the chair. The secretary, Mr. H. Clarke, read the report. During the year 165 services had been laid in for the supply of 500 new customers. The balance-sheet showed the gross revenue for the year ending the 1st of May, 1872, to be £5488 9s. 4d., and the expenses for the year, £3527 19s. 6d., leaving a balance of £1960 9s. 10d. The directors recommended a dividend of twenty shillings per share, being at the rate of 5 per cent. per annum. The extensions this year having exceeded the clear annual profits, His Grace the Duke of Northumberland is not entitled to his one-seventh share. The whole of the company's pumping stations, reservoirs, and other works are in efficient working order. The report was adopted, and, after the directors had been elected, the meeting concluded. Mr. T. M. Favell had been appointed engineer in the place of Mr. Hanison resigned.

DEARTH OF WATER IN BERMONDSEY.—At the meeting of the vestry of this parish, on the 1st inst., Mr. Wilkinson, law clerk, read the following report with reference to the water supply:—"Gentlemen, I beg to report that in pursuance of the resolution passed at the last board, I immediately wrote to the Southwark and Vauxhall Water Company, asking that they would be pleased to receive a deputation from this board on the subject of an insufficient supply of water to different parts of the parish. The secretary replied that he would have no court for some short time, but the engineer would wait upon me in the course of the following day. Mr. Restler, from the engineer's office, called, and said he hoped the complaint had been remedied. Meanwhile, on the 22nd, on a letter from the Board of Trade, whose attention had been called to the meeting by the press, at the request of your chairman all the information possessed by the board—namely, my letter to the water company, your medical officer's report, a copy of the minutes of last meeting, and a statement of all complaints sent to the company, newspaper reports, and letters received from the inhabitants—were forwarded for the information of the Board of Trade. A memorial having been signed by upwards of 20 inhabitants and householders, Major Bolton was appointed to ascertain the cause of the complaint. On Thursday last Major Bolton, having investigated the matter, called on me, accompanied by Mr. Quick, the engineer of the water company, and, with your medical officer, a lengthened interview took place. Major Bolton informed me that the substance of his report would be that the cause of complaint was principally on account of the water company having insufficient reservoirs for the storeage of water; that larger reservoirs must be provided; and also that the company (and also the landlords of the houses complaining) must see that the fittings were in a proper condition. The present cause of complaint arose from the fact of an immense quantity of vegetable matter having, immediately preceding the late storm, come down the river and choked the filter-beds, and it was impossible without the water being filtered to send it on for use. It is, in the opinion of Major Bolton, most important that every house should be separately connected with the main, which is not the case where the complaints have arisen. Mr. Quick informed me that two very large reservoirs are about being constructed at Nunhead, which he hoped would have the effect of remedying the cause of future complaints; and he also added that should a recurrence of the present difficulty occur, he should recommend that stand-pipes, as in the case of frost, should be erected for the immediate supply to the sufferers until the mains were sufficiently charged to supply the inhabitants at their houses. As the board of Trade at once took action on the memorial submitted, I have not thought it necessary to prepare a memorial to be presented by this board, which would, of course, be supplemental only."

THE INSTITUTION OF CIVIL ENGINEERS.—During the quarter ended on the 30th of June, the deaths were recorded of 5 associates—viz., John Samuel Enys (diploma dated March 12, 1839), Frederick Marrable (March 4, 1856), Augustus Siebe (Dec. 2, 1856), Robert Harry Inglis Synnot, M.A. (Feb. 2, 1864), and Christopher Pattison (Dec. 5, 1871). In the same period 2 students tendered their resignation, which were accepted, and the names of 1 member, 5 associates, and 1 student, were erased from the register. Thus in the three months, from all causes, only 14 of the various grades ceased to belong to the society. On the other hand, the elections comprised 2 honorary members, 8 members, and 50 associates (9 of the latter having previously been students), 1 associate was restored to the list, and 20 candidates were admitted students. The additions were, therefore, 72, and the net effective increase was 58. The roll of the institution now contains the names of 2142 members of all classes.

THE MANUFACTURE OF ANTHRACENE.—To the industries followed by the Paris Gas Company for the utilization of products they have recently added the separation of anthracene, a process for which they have lately patented. It is very much the same as is already followed in this country for the same purpose. The thick heavy oils which pass over towards the end of the distillation of tar deposit a crystalline matter when submitted to cold, which is crude anthracene. This is separated from the oil by filtration, and, according to the Paris patent, is purified by successive remeltings and very slow cooling, by which means the anthracene is obtained in larger crystals, which are easily strained from the oils. In England we believe the crystals are percolated in the cold with light petroleum oils which easily displace the heavy oil from the tar. According to the French patent the so far purified product is to be again melted and cooled into a mass, which is submitted to great pressure to remove any oil yet adhering. If a still purer article is wished for, the anthracene may be sublimed in a current of carbonic acid or hot air from a furnace flue. In this way an almost white and beautifully crystallized anthracene is obtained.

COAL IN THE NORTH OF SCOTLAND.—At the last meeting of the South Midland Institute of Mining, Civil, and Mechanical Engineers in Wolverhampton, the president, Mr. E. Jones, mining engineer, gave the result of certain recent investigations made by him with and for the Duke of Sutherland on his north of Scotland estates. In Sutherland, where he had expected to find granite, with scoria and other traces of igneous action, he had found coal. He believed the field would prove of great value, that the carboniferous ironstone associated with it would be found lying immediately beneath the oolite, which was the formation at the surface, and that this would prove to be of a larger area than any other known coal-field in Scotland. He had traced the coal from the river Brora to the Frith of Dornoch, and upwards along the eastern edge of Sutherland to Helmsdale. Sinkings would soon be made, and the powerful machinery for conducting the operations would be under his direction. The work would have an important bearing upon the question of the existence of coal between London and Dover. The president showed fossil specimens of the oolite formation that he had brought from the quarry of which Dunrobin Castle was built, and beneath which Mr. Jones believes the coal is lying. Going on to speak of the coal-fields of the immediate district, he asserted, as the result of close observation extending over forty years, that the coal of Shropshire is being rapidly worked out.—*Scotsman.*

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1953.—HENRY GIROUD, of Paris, department of the Seine, in the French Republic, merchant, for "*A new and improved system of rheometric regulator, used with a gas-burner only.*" June 28, 1872.

1956.—THOMAS HENRY PHILLIPS, of the firm of Phillips and Son, the Eagle Works, 25 and 26, Barbican, in the City of London, hot water and gas engineer, for "*Improved apparatus or appliances applicable for heating, cooking, and lighting purposes.*" June 28, 1872.

1964.—BARNABAS RUSS, of Lime Street, in the City of London, engineer, for "*Improvements in the manufacture of gas and in the treatment of the residues therefrom, in the means of purifying and rectifying the same, and in the combination or amalgamation of gases for the production of light and heat, and for other useful purposes, and in the machinery and apparatus to be employed therein.*" June 29, 1872.

1967.—WILLIAM CORP ROGERS, of 1, Basinghall Street, in the City of London, for "*Improved apparatus or appliances for regulating the supply or flow of gas to burners.*" June 29, 1872.

1990.—HENRY JAMES HOGG KING, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in apparatus for obtaining motive power for pumping or for measuring fluids.*" July 2, 1872.

1996.—JOHN MORCOMBE BROMLEY BAKER, of Lennox Road, Southsea, in the co. of Hants, for "*An improved disinfecting and deodorizing apparatus for water-closets and other purposes.*" July 2, 1872.

1999.—JOHN WALLACE, of 16, Grove Villas, Grove Street Road, N.E., for "*Improvements in gas-stoves and burners, and regulating apparatus to be used in connexion therewith.*" July 2, 1872.

2035.—BRERETON TODD, of 8, Victoria Square, Newcastle-upon-Tyne, for "*Improvements in the treatment of gases and fumes.*" July 5, 1872.

2036.—ETIENNE JULES LAFOND COILLOT, of Barcelona, Spain, chemist, for "*Improvements in the manufacture of lighting and heating gas, and in apparatus and burners connected therewith.*" July 5, 1872.

2045.—WALTER WILLIAM TONKIN, of 221, Brixton Road, London, engineer, for "*Improvements in the means of actuating the valves of engines, pumps, or liquid-meters.*" July 6, 1872.

2053.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*An improved ventilating apparatus.*" A communication. July 6, 1872.

2054.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in cooling air and gases and in the apparatus or means to be employed therein.*" A communication. July 8, 1872.

2058.—CHARLES DENTON ABEL, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, for "*An improved portable apparatus for impregnating air with hydrocarbon vapours or volatile oils for lighting and heating purposes.*" A communication. July 8, 1872.

2065.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*An improved compound and method of preparing the same for the construction of street pavements, and for other like purposes.*" A communication. (Complete specification.) July 9, 1872.

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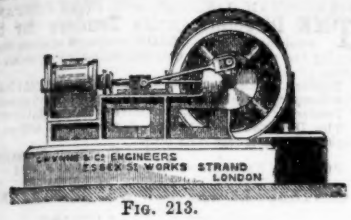

FIG. 213.

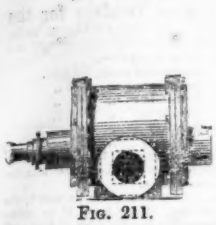
FIG. 211.

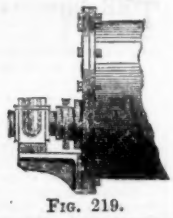
FIG. 219.

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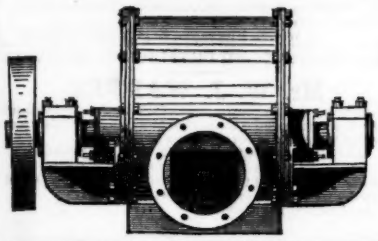

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The air admitted through the Patent Clips prevents all undue draught; this ensures perfect steadiness of flame, and no smoky glass.

They are strongly recommended for towns on the coast, and all hilly districts, as they preserve a steady light when exposed to strong winds.

FOR FOREIGN GAS COMPANIES THEY ARE INVALUABLE.

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WILLIAM KEEN,

SOLE PROPRIETOR AND MANUFACTURER,

ROBERTSON STREET, HASTINGS, SUSSEX.

GAS-WORKS.

WANTED, an active Working Manager of experience, who is competent to take charge of moderate sized works. Wages about 24s. per week, with house, firing, and gas free.

Apply to the SECRETARY, Gas-Works, Sutton Coldfield, near BIRMINGHAM.

TO GAS-FITTERS.

WANTED immediately, a respectable, steady, sober Man as GAS-FITTER and METER INSPECTOR. He will be required to lay mains and services, and must be able to do the whole of the smith's work required on the works.

Applications, in own handwriting, stating age, &c., accompanied with testimonials, to be sent not later than the 1st of August, to MR. J. WILSON, Secretary and Manager, Gas-Works, Abingdon, BERKS.

GAS MANAGER.

WANTED, a Gas Manager of experience fully competent to take charge of the works of the Yeovil Gas and Coke Company, manufacturing about 15,000,000 feet per annum. Salary £120 a year, with house, coal, and gas.

Applications by letter only, endorsed "Gas Manager," stating age and qualifications, and enclosing copies of testimonials, to be addressed to the CHAIRMAN of the Company, Yeovil, on or before Saturday, the 20th inst.

DRAUGHTSMAN.

WANTED, a Mechanical Draughtsman well acquainted with the designing of gas apparatus and the necessary buildings.

Address, stating experience and wages expected, to G. M., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Mauritius Gas Company, Limited, a competent person to act as GENERAL FOREMAN of their works at Port Louis. Must be thoroughly acquainted with the manufacture and distribution of gas, retort-setting, main and service laying, fittings, &c., and of sober, well-conducted habits. Age not to exceed 35. Liberal wages will be given to a suitable man, and free passage.

Apply, with full particulars, and stating whether married or single, to A. HERSEE, Esq., Secretary, 39, Old Broad Street, LONDON.

COOKING AND HEATING BY GAS,

BY

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NEW AND REVISED EDITION.

Prepared for Gas Companies to circulate amongst their gas consumers.

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STOKERS.

THE Neath New Gas Company are in immediate want of two leading STOKERS.

Address WILLIAM DORE, Neath, SOUTH WALES.

A Young Man, aged 26, served nine years in a Gas-Work making 50,000,000, desires a re-engagement either as MANAGER or Chief RENTAL CLERK. Uses the photometer. Highest references. No objection to go abroad.

Address Mr. PATERSON, Engineer, Warrington Gas Works, Warrington, LANCASHIRE.

THE Advertiser, who has had many years experience, is desirous of obtaining the Management or Lease of a Gas-Work, or would invest capital in the erection of new works.

Address 7, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ANALYSES OF GAS COALS, PHOTO-METRY of GAS, OILS, and CANDLES, and Researches connected with the Chemistry and Photometry of Gas Lighting.

Conducted by DR. WALLACE,
Consulting and Analytical Chemist, and Gas Examiner for the City of Glasgow.

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GAS LABORATORY, 29, ALSTON STREET.

TO GAS COMPANIES.

WANTED, to lease a Gas-Work where the make is not less than 3,000,000 feet per annum. Address ROBERT DEMPSTER, Engineer, Elland, near Halifax, YORKSHIRE.

BIRMINGHAM GASLIGHT AND COKE COMPANY.

THE Directors of the above Company require a thoroughly competent CHIEF ENGINEER for their works. Salary £500 per annum.

Applications, stating age and qualifications, and accompanied by testimonials, to be sent to the Chairman on or before the 24th inst.—By order,

JOS. SLOCOMBE, Secretary.

Offices, 23, Union Street, Birmingham, July 9, 1872.

BOROUGH OF BRADFORD, in the County of York.

GAS-METER INSPECTOR AND INSPECTOR OF WEIGHTS AND MEASURES.

THE Corporation of Bradford require the services of a thoroughly competent person to execute the duties of INSPECTOR OF GAS-METERS within the said borough, under the Acts of Parliament in that behalf. He will also be required to act as INSPECTOR OF WEIGHTS AND MEASURES for the same district. Salary £120 per annum.

Applications in the applicant's own handwriting, stating age and qualifications, and accompanied with testimonials, to be addressed to the Chairman of the Markets Committee, and be delivered at the Corporation Offices, Swaine Street, Bradford, at or before Twelve at noon, on Monday, the 22nd inst., endorsed "Gas-Meter Inspectorship." The person appointed will be required to devote his whole time to the duties of the office.—By order.

W. T. M'GOWEN, Town-Clerk.

Corporation Offices, Bradford, July 10, 1872.

BOILERS, ENGINE, AND EXHAUSTER FOR SALE.

TO BE DISPOSED OF, at the Shrewsbury Gas Company's works, Two BOILERS, equal to new, 8 ft. 3 in. by 3 ft. 6 in. EXHAUSTER capable of exhausting 10,000 cubic feet per hour, Anderson's design, together with a 4½-horse Beam ENGINE for driving same. Price £160. S. B. DARWIN, Secretary and Manager.

STATION-METER for Sale, to pass 6000 feet per hour. Is of the best description, and nearly as good as new (by Laidlaw).

Apply to Shotley Bridge and Consett District Gas Company, Green Street, SHOTLEY BRIDGE.

FOR SALE, a Vertical Condenser, consisting of 12 double rows of 6-in. pipes, with arch pipes, bottom box 12 ft. 6 in. long, tar pipe, and dip bucket, all in good condition.

For price and further particulars, apply to H. CRANMER, Manager, Gas-Works, STRATFORD-UPON-AVON.

FOR SALE, 190 lengths, 9 feet, of 5-inch T and B GAS-MAIN, thoroughly cleaned and nearly equal to new.

For price apply to T. H. BOUTTELL, Manager, Gas-Works, SLEAFORD.

FOR SALE, a Station-Meter, by Crossley, to pass 2500 feet per hour, with clock and tell-tale, inlet, outlet, and bye-pass valves, and all necessary 5-inch connexions. Ready for immediate removal.

Apply to S. CROSS, Manager, Gas-Works, Abergavenny, MONMOUTHSHIRE.

SIDMOUTH GAS-WORKS, DEVONSHIRE.

TO BE SOLD by Auction, at the London Hotel, Sidmouth, on Wednesday, the 24th day of July, at four o'clock in the afternoon, subject to the conditions which will be then and there produced, the SIDMOUTH GAS-WORKS, in the occupation of Mr. Henry Ellis, comprising a large Gas-House, with bed for 12 retorts, Condensers, Scrubber, 2 Purifiers about 6 ft. by 6 ft. by 3 ft., and 2 Gasholders, one built within two years, with cast-iron Tank constructed to hold 9000 cubic feet of gas and the other capable of holding nearly the same quantity, together with cottage, coal stores, and smith's and fitting shops, &c.

There are several miles of MAINS, from 5-in. downwards, which, with the Public Lamps and Lamp Posts belonging to the vendors, will be included in the purchase.

As the agreement under which the present occupier and joint owner is carrying on the works expires in August next, possession will be given on completion of the purchase, when the purchaser will be required to take at a valuation the existing stock of coals, coke, &c., and also all meters, tools, implements, and tenant's fixtures.

The population of Sidmouth is upwards of 3300, and there are at present about 80 public lights, but there can be no doubt that on the completion of the proposed railway the consumption of gas, for both public and private lights will be greatly increased.

The land on which the above works and buildings are erected is held for the residue of a term of 2000 years.

Further particulars may be obtained on application to Mr. Henry Ellis, at the works; to Mr. Edward Millington, Land Agent and Surveyor, Holbeach, or to Messrs. Radford and Williams, Solicitors, Sidmouth.

Sidmouth, June 24, 1872.

THE NEW GAS COMPANY, WIMBORNE MINSTER, DORSET.

TENDERS and Specification are required by Aug. 1 for the erection of a GASHOLDER, 50 ft. diameter, 14 ft. deep; side sheets, No. 15; top sheets, No. 14; with six cast-iron columns, girders (wrought or cast), and balance-weights complete. The inlet and outlet pipes to be 8 in. diameter.

Also a round SCRUBBER, 10 ft. high, 3 ft. diameter, fitted with liquor distributor.

The whole to be completed in the best manner by Dec. 1 next. The Company will not be bound to accept the lowest or any tender.— R. P. HOPKINS, Manager.

CONTRACT FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company are prepared to receive TENDERS at per ton for the surplus TAR made at their works for One year from the 30th day of September next, to be removed from the works as often as required. Cash monthly.

Any further information can be obtained from the undersigned. Tenders to be sent to me on or before Monday, Aug. 12, 1872.

The Directors do not bind themselves to accept the highest or any tender.—By order,

WM. A. PADFIELD, Secretary.

Gas Offices, Exe Island, Exeter, July 12, 1872.

ST. JOHN'S GAS-WORKS, PORTO RICO.

MR. J. E. STEINACHER, Gas Engineer, Porto-Rico, W.I., will receive TENDERS for—

One GASHOLDER, 44 ft. diameter, 12 ft. deep, with six cast-iron columns, girders, balance-weights, chains, inside bars, and everything, all complete, of best materials. Side sheets No. 15, and top or roof sheets No. 14, with inlet and outlet pipe, 8 in. diameter.

Two Syphons for inlet and outlet.

One Wrought-Iron Hydraulic Main, 18 in. diameter, 20 ft. long, for two ovens of five retorts.

Fifteen Cast-Iron Ascension Pipes, 4 in. diameter, 8 ft. long.

Ten Cast-Iron Retorts, oval, 15 by 22 in., and 8 ft. long.

Fifteen Cast or Wrought-Iron Mouthpieces for retorts, with patent fastening and self-acting lids.

Fifteen H-Pipes for ascension-pipes and hydraulic main.

Two Hundred Yards Cast-Iron Main-Pipes, 8 in. diameter.

One large Condenser, enough for the condensation of 3000 cubic feet per hour.

One Set of Four or Six Cast-Iron Purifiers, 5 ft. 4 in. square, 4 ft. deep, 3 divisions inside, complete, with a Walker's patent centre-valve.

One Gas Station Meter, to pass 3000 cubic feet per hour.

One Gas Governor or Pressure Regulator.

Two Hundred Lamp-Post Columns, 9 ft. high from base to top, with lanterns, for Street.

Fifty Cast-Iron Brackets, to put in walls, 3 ft. long, with lanterns, for street.

Two Hydraulic Valves for main-pipes.

Tenders to be sent on or before FRIDAY, AUG. 30, 1872.

Porto Rico, June 9, 1872.

CONTRACT FOR GAS COALS.

THE Committee of Management of the Hereford Corporation Gas-Works are prepared to receive TENDERS for the supply of 4000 tons of best GAS COALS from the 1st day of September, 1872, to the 31st day of May, 1873.

The tenders must state the description of Coal, together with the price per ton for each description.

The Coals to be delivered in the following monthly quantities into the Corporation Stores at the Gas-Works (each monthly delivery to be distributed throughout such period as evenly as possible):—

September, 1872	350 tons.
October, 1872	400 ,,
November, 1872	550 ,,
December, 1872	650 ,,
January, 1873	600 ,,
February, 1873	450 ,,
March, 1873	400 ,,
April, 1873	350 ,,
May, 1873	250 ,,
Total	4000 tons.

The whole of the Coals to be unscreened, and free from bats, dirt, or pyrites, and fit for gas purposes to the satisfaction of the Manager of the Gas-Works.

The Committee do not bind themselves to accept the lowest or any tender; but the person or persons whose tender may be accepted will be required to execute a contract for the due performance thereof.

Tenders to be forwarded, under seal, endorsed "Tender for Gas Coal," to the undersigned, on or before Wednesday, the 24th inst.—By order of the Committee,

July 10, 1872. WILLIAM DAVIS, Manager.

MICHAEL & WILL'S LAW OF GAS AND WATER SUPPLY.

Just Published, post 8vo., 18s., *cloth,*

THE LAW OF GAS AND WATER SUPPLY, comprising the Rights and Duties as well of Local Authorities as of Private Companies in regard thereto, and including the Legislation of the last Session of Parliament. By W. H. MICHAEL and J. SHIRESS WILL, of the Middle Temple, Esquires, Barristers-at-Law.

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Her Majesty's Law Publishers.

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THE Electric Telegraph Department of our business is most efficiently conducted by an experienced staff. CONTRACTS entered into for maintenance and erection of lines for Gas and Water Companies, private residences, hotels, &c. Bailey's simple A B C instrument is stronger and less liable to derangement than any other in the market. Price £6 per pair. Makers of maximum and minimum Electrical Indicators and Signals for Reservoirs. Water Pressure Recorders. Managers of Gas and Water Works are invited to ask us for our quotations, or for any information connected with Telegraphy.

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J. BAILEY and Co., Albion Works, Salford, Lancashire.

TO GAS COMPANIES, ENGINEERS, &c.

WOOD SIEVES.—WOOD SIEVES.

Estimates given and Contracts taken by the Manufacturer

GEORGE MACKANESS,
36, EDWARD STREET, HAMPSTEAD ROAD,
LONDON, N.W.

These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.

N.B.—Specimens sent free on application.

CLAYTON'S PATENT SIX-WAY VALVE only requires one valve to work two purifiers; saves more than three-fourths of the connexion-pipes; requires neither tees, elbows, nor bends; no racks or springs to get out of order.

For particulars, apply to CLAYTON, SON, & Co., Gas Engineers, Hunslet, LEEDS.

BIRMINGHAM GASLIGHT AND COKE COMPANY.

THE Directors invite Tenders for the whole of the Spent OXIDE produced at their works during the year 1873, in quantity estimated at about 400 tons.

Tenders, which must be at a price per ton of 2240 lbs. at the Company's works, to be sent to the Secretary, endorsed "Tender for Spent Oxide," not later than the 31st inst.

The Directors do not bind themselves to accept the highest or any tender.—By order,

JOS. SLOCOMBE, Secretary.

Offices, 23, Union Street Birmingham, July 9, 1872.

CANTERBURY GAS AND WATER COMPANY.

CONTRACT FOR GAS COALS.

THE Directors invite Tenders for the supply of 3000 tons of good GAS COALS, to be delivered in a dry state in the following proportions, and weighed on the Company's weighbridge:—

During the month of	September next,	300	tons.
,,	October ,,	400	,,
,,	November ,,	600	,,
,,	December ,,	700	,,
,,	January ,,	600	,,
,,	February ,,	400	,,

Each tender must state the name of the Coals offered, and a price at per ton delivered free of all expense into the Company's stores at the Gas-Works.

Tenders, marked "Tender for Coals," to be sent to the Secretary's Office, Castle Street, Canterbury, at or before Ten o'clock in the forenoon of Friday, the 26th of July inst.

The person whose tender may be accepted must enter into a contract for the supply, and provide two sufficient sureties if required.

The Directors reserve the right to reject all or any of the tenders. JAMES BURCH, Secretary.

Canterbury, July 10, 1872.

DARLINGTON CORPORATION GAS-WORKS.

TO IRONFOUNDERS, &c.

THE Gas Committee of the Darlington Corporation invite TENDERS for the supply of the following:—

CONTRACT No. 1.—Nine wrought-iron GIRDERS, 18 in. deep, and of various lengths.

CONTRACT No. 2.—Two 16-ft. square PURIFIERS—to be connected to four now in use—with wrought-iron lids and air-valves; five tiers of wood sieves, lifting apparatus, valves, and connexions.

CONTRACT No. 3.—One square STATION-METER, to pass 30,000 cubic feet per hour, with bye-pass, valves, and connexions.

Contractor for Purifiers and Station-Meter to erect same on foundations built by the Committee.

Drawings and specifications may be seen at the Manager's Office, Gas-Works, Darlington.

Tenders to be sent to the undersigned, addressed to the Gas-Works, on or before the 24th inst. The lowest tender not necessarily accepted.

WM. B. EMMERSON, Engineer and Manager.

MANUFACTURE AND DISTRIBUTION ACCOUNTS.

Mr. W. J. WARNER

Begs to say that in consequence of the number of inquiries he has received relative to the above form of Accounts, which he had the pleasure of submitting to the BRITISH ASSOCIATION OF GAS MANAGERS, AT THEIR LATE MEETING IN DUBLIN, he has been induced to publish them, and is now prepared to supply the two sheets, post free, for 5s.

Applications to be made to

Mr. W. J. WARNER,
Engineer,
GAS-WORKS, SOUTH SHIELDS.

Mr. ALFRED LASS,
27, WALBROOK, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.

Offices: 22, Coleman Street, LONDON, E.C.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

OLD RETORTS, old Cast and Wrought Scrap, and Metals of every kind, Borings, Turnings, &c., purchased by HUDD AND CO., General Factors, Metal and Machinery Merchants, No 6, Castle Terrace, NOTTINGHAM.

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WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire-Bricks and every description of Fire-Clay Goods.

OXIDE OF IRON.—
We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

CONTENTS.

	Page
Notes upon Passing Events:—	
The Thames Embankment	645
The Purchase of Irish Railways by the State	645
Columbia Market	646
Credit in France and England	646
The Abolition of Capital Punishment	646
Circular to Gas Companies:—	
The Municipal Corporation (Borough Funds) Bill	647
Questions for the New Gas Referees	647
Difficulties of the Corporation of Ryde	648
The North British Association of Gas Managers	648
Advances in the Price of Gas	648
Mr. George Anderson	648
The Patent Gas Company	648
The Report of the European Gas Company	648
Correspondence:—	
Gas Purification	648
The Hydraulic Main	649
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	649
Progress of Bills in the House of Commons	649
Legal Intelligence:—	
Vice-Chancellor's Court—The Attorney-General *v.* The Corporation of Birmingham	650
Worcestershire Assizes—Westley *v.* The South Staffordshire Water-Works Company	650
Bacup Petty Sessions—Serious Charge against a Gas Sub-Manager	651
Chepstow County Court—Chepstow Gas and Coke Consumers Company *v.* Henry Hughes	651
Huddersfield County Court—Martin *v.* Dawson	652
In Arbitration—Handley *v.* Bury and Radcliffe Water-Works Company	652
Clerkenwell Police Court—Charge of Embezzlement against a Collector of the Imperial Gas Company	653
Rochester Police Court—Charge of Stealing Water	653
Miscellaneous News:—	
Meeting of the European Gas Company	653
Water-Rates in the City of London	654
Gas Purification at Beckton and Bow	655
Amalgamation of the Western Gas Company and The Gaslight and Coke Company	655
Huddersfield Corporation Gas-Works—Increase in the Price of Gas	656
East Barnet Gas Company	656
The Corporation of Ryde and the Gas-Works Purchase Arbitration	656
Major Bolton's Report on the Metropolitan Waters for the Month ending July 15	657
The Accident at the Neepsend Work of the Sheffield Gas Company	657
Supply of Gas to Arbroath	657
The Wimbledon Sewage Scheme—Government Inquiry	658
Opening of the New Gas-Works at Audlem, Cheshire	659
Dewsbury and Batley Gas Company	659
Kirriemuir Gas Company	659
Berwick Gas Company	659
Supply of Gas to Southminster—Increase of Price by Agreement	659
Wisbech Gas Company	659
Supply of Gas at Whitehaven	659
North British Association of Gas Managers	659
Gas Explosion at Holmfirth	660
The Serious Explosion on a Steamer	660
Fatal Accident at the Crews Hole (Bristol) Tar and Resin Works	660
Further Advance in Price of Tubes	660
Return by the Metropolitan Association of Medical Officers of Health of the Average Composition and Quality of the Metropolitan Waters, in July, 1872	660
The Purchase of the Lincoln Water-Works	660
Kilmarnock Water Company	660
Dundee Water Supply	660
Water Supply of Glasgow	660
Bermondsey Water Supply	660
Sewage of Towns	661
Register of New Patents:—	
Jochumsen, N.—Valves for Pumps	661
Parry, F.—Drying Precipitated Sewage	661
Scott, H. Y. D.—Treatment of Sewage	661
Zenger, K. W.—Manufacturing Gas	661
Webb, W.—Joints or Connexions for Pipes	661
Bright, H.—Drying Sewage, &c.	661
Goulding, W. F.—Packing for Joints	661
Fletcher, J.—Packing-Rings	661
Newton, A. V.—Preventing Oxidation or Corrosion of Iron	661
Prosser, W.—Conducting and Distributing Sewage	661
Westo and Pinder—Water Cisterns	661
Peebles, D. B.—Gas-Regulators	662
Applications for Letters Patent	662
Grants of Provisional Protection	662
Inventions protected for Six Months	662
Notices to Proceed	662
Notice of Application for a Disclaimer	663
Patents which have become void	663
Price Current	663
Share List of Metropolitan Gas Companies	663

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 30, 1872.

Notes upon Passing Events.

The Government invited and sustained a defeat on the Thames Embankment Bill, which may be distinctly traced to the unpopularity of the two departments of the Woods and Forests and the Board of Works, and to the natural inclination of the House to resent the cynical snubs bestowed on them from time to time by the Chancellor of the Exchequer. The amount to be paid for the land—£3000—was no great sum, although it is difficult to see why the public should be worse treated than the Duke of Buccleuch, whose whole tenure of Montague House is based upon a Woods and Forests job. But the House does not like being defied and bullied by subordinate members of Government, like Mr. Gore and Mr. Ayrton. No doubt some of the majority were thinking more of Ayrton *v.* Hooker than of the Embankment; others not unwisely want a thorough investigation of the very unsatisfactory and almost irresponsible management of the Woods and Forests. Mr. H. Vernon Harcourt put this in one comprehensive sentence: "The question was not simple, for its discussion would involve, "amongst other things, a consideration of the way in which the "public lands of the country were, and ought to be, administered." Then again the negotiation for acquiring Northumberland House, which commands the very best access to the Thames Embankment, whether going east or west, was a reason for delay. The Metropolitan Board of Works have the advantage now of a chairman moving in good society, able to take steps of an informal, unofficial character in delicate negotiations, by which so much more can be done than by the formal letters of secretaries and solicitors. Colonel Hogg can approach great personages. We are not the less hopeful of the successful termination of this negotiation because, in the preliminary steps, the Duke has been careful to preserve his liberty of action, and declined even "to "negotiate" until he knew what were the ultimate plans of the Board. On the question of whether there shall be any buildings on the Embankment a great deal of nonsense has been talked. The whole point rests on "what sort of buildings." Buildings, even if shops and hotels, properly designed and properly placed, would not only add to the picturesqueness of the vista, but attract a traffic that is very much needed to save so wide a thoroughfare from the absurdity of uselessness. This St. Stephen's Club, which is intended to occupy the place of a very ugly tavern, may add to, instead of deteriorating from, the effect of the Palace of Westminster. The idea of leaving a vast open space round every public building is something quite new; but if it is to be carried out, why not begin by clearing away St. Margaret's Church?

Irish railways will shortly become the property of the Government! It may not be in 1873 or in 1874, but the purchase is a settled thing; no matter whether economically and socially it is a good thing or not. In the first place, the Irish people of all shades of political and religious opinion, are anxious to conclude a transaction that will put money of the State into the pockets of so many Irishmen. The shareholders modestly ask for a profit of thirty-five per cent., and, although they are willing vendors, will probably get, because they are discontented Irishmen, ten per cent. more than the most unwilling vendors in England or Scotland. Then the experiment of the lowest possible rates and fares will be tried at the risk of imperial revenues, and trade will be considerably developed although not so much as if pigs, butter, and cattle were carried entirely free. Then every place that thinks a branch railway will serve it, will hope to get it from a squeezable Government. First, the cry will be for low fares, then parliamentary electors will be coaxed with the promise of more branches. It is true that there are fifty-six solicitors, fifty-six secretaries, more than seventy engineers engaged on the Irish lines, besides four hundred and thirty directors, all of whom would have to be pensioned or provided for, but that will not prevent quite as many Irishmen not at present in office from calculating on filling some of these posts. The Government in *esse* and in *posse* naturally view the project for expropriating the Irish railways with favour. Each consents to the scheme as a means of gratifying a part of the kingdom that can never be satisfied, and neither dare refuse such a lever for securing for one session the Irish vote. The Chancellor of the Exchequer, who is a political economist, might demur; but Mr. Gladstone, if the Irish will not insist on too grand a job, dare not refuse to play the card with which, if he hesitates, Mr. Disraeli will be sure to trump his best lead. Mr. Goldsmid was simple enough to object that the conversion of all the berths on Irish railways into appointments for life, with pensions for everybody, from the platelayer to the secre-

tary, would open a door to political jobbery; but, in the eyes of Liberal and Tory Governments alike, this is not an objection, but a recommendation. The first effect would be to create a large number of supporters of the Government *de facto* as staunch as the police. Every past Secretary for Ireland has known the misery of having to meet a crowd of mendicants it was impossible to satisfy. In Ireland there are always more piglings than teats on the official sow. Now the purchase of the Irish railways would create by one royal signature some thousand places. All the difficulties would be in the future, when an army of disappointed place-seekers had been created—when a number of towns found that they could not all have branches or trains at forty miles an hour for their especial accommodation—when the limit had been reached below which it was found impracticable, looking at the unreasonable Saxon Parliament, to lower rates and fares — when the sea-side was reached, and the Government hesitated to subsidize steamboats, or perhaps omnibuses and cars. But, after all, the future can take care of itself. Thirty millions is at least eight millions more than Irish railways are worth, but it is a small sum if it would give peace for three years with no more unpleasant demonstration than the occasional shooting of an obnoxious station-master or other officer wearing the Government livery. Some of Sir Rowland Blennerhassett's grievances were curious; for instance, that a train took 5½ hours to do 130 miles, which is a much faster pace than the Belgian, or most of the German lines. It also never seemed to occur to the Irish members who took part in the debate, that the mismanagement, corrupt management, and stupid management of Irish railways by Irishmen was a sad libel—the greater the truth the greater the libel—on the self-governing powers of a people which is continually complaining of Saxon rule. If Irish patriotism went further than windy speeches, it would be easy for an Irish syndicate to raise 20 millions, or enough to buy out the original shareholders, and amalgamate and reorganize the Irish system under a special Act of Parliament, assisted by a Government loan or guarantee to cover the claims of debenture-holders. But it is so much easier to alternately bully and whine before the Imperial Parliament than to subscribe. As the thing is to be done, the sooner it is done the better. Let the honesty of Ireland be put to the test by the offer of the true market value of the Irish railways according to Stock Exchange quotations on the 30th of June, 1872. Let us see if there is an Irish public opinion in favour of a reasonable bargain, or whether the love of plunder prevails over patriotism.

The case of English railways may rest until serious men bring forward a serious proposition. At present that question is farther off than Mr. Miall's disestablishment of the English Church, or Sir Charles Dilke's republic, or Mr. Samuel Morley's platform for reorganizing British society.

Under the force of aristocratic pressure and blandishment the Corporation of London consented to accept a white elephant—Columbia Market. In the construction and abortive attempts to make it a success, the Baroness Burdett Coutts had expended something like £300,000. It is quite true that Billingsgate has become insufficient for the demands of the public, not in consequence of the limited extent of the market, for it might, and is to be, enlarged, but because the narrow approaches render it inaccessible to the costermongers who are every day becoming the most important purveyors of the metropolis. All experience has shown the difficulty of establishing a new market, and never has the experiment been more earnestly tried than in the Columbia. The customers for greengroceries and all the usual demands of the East-end prefer street stalls, and were not seduced from their ancient ways by a covered market and a band of music. The Rev. Mr. Rogers proposes to turn the architect's magnificent folly to the use of a middle-class girls school, for which it is certainly more fit than anything else that has been proposed, if the pupils can be found! But the friends of the Baroness still hanker after a fish market, and cherish a theory that, with a proper market, fish might be cheapened for the benefit of the dwellers in Shoreditch. In pursuit of this idea a meeting was held the other day at the mansion of a very noble character, one duke, many lords, and members of Parliament, deputations from the East-end parishes and the fishing towns of the east coast, all bent on the same line—viz., to give the Corporation good advice, and encourage it to spend its own, not their money, for neither individual, nor Corporation, nor vestry proposed to subscribe anything more substantial than cheers. The first proposal—a tramway from the Great Eastern—is sound and simple enough, but it seems odd that none of the parishes to be benefited propose to put their hands in their own pockets. Every argument in favour of improved railway communication with Columbia was an argument for improving the access to Billingsgate Market. On that principle, all are agreed; on the necessity, all are agreed; but the question is, who is to pay for the improvement? The Duke of Sutherland was the most vivacious and the most characteristic representative of the cheap liberality involved in "your own advice and other people's "money." He is a clever man, clever enough to have made a fortune at any trade or profession; but the most remarkable feature in his character as one of the richest men in the kingdom, is his disinclination to part with money to support the causes for which he makes speeches. He appeared, he said, in the double character of a Londoner buying fish and an owner of fisheries in Scotland: in London he wants to buy cheap, in Scotland he wants to sell dear. In order to assist his friend Lady Burdett Coutts in establishing Columbia Market, he had consigned some of his salmon there, on condition that her ladyship paid him the difference between the low prices of Columbia and the higher prices of Billingsgate; but the Baroness's good intentions, for which she paid the Duke £100 a year, were frustrated by acute Billingsgate gentlemen, who attended at Columbia Market, bought up the Sutherland salmon, and carried it away in their fast-trotting pony-carts to the better market in the City. This was a stroke of trade so entirely after the Duke's own style that it is difficult to understand why he was so hard on the owners of the fast-trotting ponies. He lost nothing by them; his Grace called on the Corporation to encourage and properly develop Columbia Market, but it never seemed to occur to him that if the proprietors of Scotch fisheries, and the ports of Yarmouth, Lowestoft, King's Lynn, and Harwich, all deeply interested in a free sale of fish, were to imitate the Baroness, and subscribe to a tramway, they would be doing more for themselves and the fish-eaters than by making speeches. Lady Burdett Coutts is a very generous, well-meaning woman; but it is mere cant to say that she conferred any favour on the City by presenting it with Columbia Market. She got rid of a great annual expense which was not the least amusing, and much more costly than a steam yacht or deer forest or a series of monster garden parties. Mr. Bontems, not dazzled by the aristocratic galaxy, put the question in a very common-sense way when he said:

> The Corporation had no power to compel those who caught fish, or dealt in fish, to send it to a particular market. They had chosen to send it to Billingsgate at present, and he was not aware that the Corporation had power to prevent that. The course taken by those who had supported the idea of a fish market at Columbia had been the wrong course for the accomplishment of success. It had been held out that what was wanted in London was a market where fish could be sold at a cheap rate. He wanted to know if people having fish to send from Lowestoft or Harwich would be likely to send it to a market where it would fetch a good price, or where it would fetch a poor price? If commercial principles regulated the actions of the people in the provinces and on the coast, as they did in London, they would send the fish to a market where it would sell at the best price, and that was Billingsgate; and as long as fish fetched more at Billingsgate than in any other part of London, so long would fish continue to go there. If Columbia was to be made a success, it must be at a sacrifice to those who had fish to send. They must be contented to suffer some loss during the establishment of the market. By that means it might be able to compete with Billingsgate. Instead, as the noble duke had done, of taking the difference between the price at the two markets, traders would have to forego the loss, and this for the benefit of the poor of London. If the noble duke had done this, he might, perhaps, have assisted in making Columbia a success. Then they were told that a quantity of herrings were frequently destroyed; and, if only they could be brought to London, and the poor people could have them, what a good thing it would be. Undoubtedly it would. What prevented it? Why, the rates for carriage of the Eastern Counties and other railways. They could not get over that difficulty. If the consignors of fish and the directors of railway companies would work so heartily with the Corporation as to bring the fish to Columbia cheaper than it could be brought at present—so cheaply as to compete with Billingsgate—then they might make a fish market of Columbia, but under no other circumstances. As to the question of a tramway, unless they could be satisfied that the fish and other commodities would be sent to the market after the tramway was made, they would consider that it would be of little use for the Corporation to go to the expense of laying it down.

Mr. Rudkin, who is a public-house edition of Mr. Ayrton, and always says shrewd things in the most unpleasant manner, went further, and not only snubbed the Duke and his followers but declared that no second market was required. He might be right if the North Thames Embankment were extended to Billingsgate, a broad thoroughfare opened through Monument Yard, and the monument itself, for which he has perhaps a fellow feeling, abolished. For it is quite true that "retailers like "to do all their marketing at one place." Mr Rudkin said:

> The buyers of fish went where they could at once be supplied with everything they required for their day's use, and they would not go to two places. Columbia Market was established as a fish market, but the constituents of Mr. Holms did not go there to buy. The fact was, two markets for fish could not exist in the metropolis. How was it there was no outcry for a new market for meat from some of the outlying districts? No one dreamt of such a thing. If more accommodation were wanted, it would have to be in the same locality. The fish traders in the parts from which memorials had come had been offered stalls in Columbia, but they would not take them. What they required was not memorials from Corporations and Towns Improvement Commissioners, but from fishermen themselves—those who consign the fish. If these people would undertake to send their fish to Columbia, there would be no difficulty in the question. There were continual applications for stands in Billingsgate, but not for stands in Columbia. If they could not get the fish to Columbia, it was absurd to talk about establishing it as a fish market. Fish would not come unless it could be shown that it would fetch as much as at Billingsgate. It was the commercial fact that they could not get over.

As to the Great Eastern and Great Northern Railways, they are too keen for a dividend not to attract any new trade by suitable

rates. The meeting, at any rate, produced plain speaking, and may strengthen the hands of those who wish to make Billingsgate accessible by a new thoroughfare and a new bridge at Tower Hill over the Thames.

A writer in the *Echo*, no doubt full of ancient learning, and profoundly ignorant of the history of his own times, falls into ecstasies of admiration at the idea of the five-franc subscription to the French loan, and a distribution of the State debt under which the majority of holdings will not exceed £4. He asks "if to us "English there is not severe reproof in this spectacle? Have "we sought to build the bases of public credit on the widest "possible basis"—a remark that clearly shows that this clever writer knows nothing of the social history of the two countries. The French peasant is now slowly approaching, and beginning to understand, the system of credit which has flourished for at least a century in England, and for more than a century in Scotland. Until the advent of the ex-Emperor, the French peasant, or artisan, had only one idea of accumulation. He hoarded in pots or stockings, buried in the earth or in his cottage, until he was able to invest in a rood or an acre of land. The Emperor taught him the meaning of interest in the public debt. The Republic is about to profit from the hoards made during the late war and revolution. In England we have no need of a new debt to bring out the savings of the thrifty mechanic, labourer, or small tradesman. Long ago they learned the value of interest in the savings bank, and this inclination has been multiplied tenfold by the Post-Office Savings Banks. But, in addition to this national security, there are thousands of institutions, in building societies, friendly societies, and co-operative societies, scarcely known, and, if known, but little trusted in France, where every one distrusts his neighbour. Since the diffusion of joint-stock bank branches, very small people in England and Wales have bank accounts, while in one of the great manufacturing towns of France the system of cheques for sums under some thousand francs is quite unknown. In England, the frugal mechanic who desires to establish a small business has a hundred times more assistance in credit from wholesale dealers than in France—no small start in a working man's life. Then, again, as to the distribution of land, it is quite evident that agricultural labourers will soon be able to dictate reasonable terms—to decline to work without security, in addition to wages, for a good cottage, garden, potato-ground, and, where there is pasture, feed for a cow; these will no longer be favours doled out or capriciously refused; they will be bargains. There are also signs that reforms facilitating and cheapening the transfer of land cannot be long delayed. But when we are called upon by desk philanthropists, like the writer in the *Echo*, to admire the social condition which the universal distribution and passion for land has produced in France, we have a right to pause and examine the question as a whole. In the first place, it is not satisfactory in an agricultural point of view. Small crops of grain and roots—little beef and less mutton—rude implements—no artificial manures—frequent naked fallows—these are the inevitable results of widespread peasant cultivation out of a vineyard country. The social and political effects are worse. A dead-level ignorance—all powers in the hands of functionaries or priests; the priests rule the women, the prefects and police the men; thus liberty, if temporarily gained, is lost. Constitutional Government is impossible, for all the gentry—who might be independent leaders of constitutional opposition—are levelled down. The equality of fortunes makes official functionaries supreme, whether imperial or republican. Truly we have much to mend, much to reform, after reforming for forty years; while in France revolution follows revolution, without producing one fiscal or social reform.

The discussion on the abolition of capital punishment ended in an overpowering majority on the side of peaceable people. Murderers are of two classes—those who slay because they hate, and those who add murder to hide some other crime, robbery or rape. The argument for abolishing the punishment of death for robbery or rape was sound, because the criminal had every temptation to murder after having ravished or robbed, he was already guilty of a hanging offence, as the dead tell no tales. One more offence made his conviction less certain, and his punishment not greater. But, on the other side, to enact that no murderer shall be hung, is to put a premium on murder. What would be the value of the life of a zealous policeman under such circumstances? But there are another class of would-be murderers still more dangerous—those who slay for revenge. How faint a punishment does imprisonment seem to the jealous husband, wife, or lover. A much-trusted physician or priest could tell strange stories of the deterrent effect of capital punishment. In the United States there have been wild districts where the judge was timid and the juries sympathetic; but Judge Lynch stepped in, hung up a round dozen, and the township was pacified. To abolish capital punishment for premeditated murder is to recall into vigour private vengeance. Artemus Ward was not far wrong when he said on the day "when the lion and the lamb lay "down together, the lamb would be inside the lion."

Circular to Gas Companies.

The Municipal Corporations (Borough Funds) Bill is now, after unaccountable delays, passing through its final stages in the House of Commons, but it may be doubted whether it will be possible for the measure to become law this session. In the course of last week some very important alterations were made in the Bill. On Wednesday Mr. Leeman very reluctantly consented to strike out the sixth clause, which was intended to allow the payment out of rates of expenses incurred within three years previous to the passing of the Act. To this clause we have strongly objected on principle, and from no ill-will to those parties who would have obtained relief if the clause had remained in the Act. Corporate bodies, like private individuals, must be bound by the law as it is, and ought not to be encouraged to expect an indemnity Act—as this would have been if the clause had been retained—to absolve individual members from the payment of expenses illegally incurred. The result is serious for the Corporation of Sheffield, but if they have the sympathy of their constituents voluntary relief is certain to be forthcoming. On the third reading, last Friday, some further concessions were made to the opposition. A proviso was added to clause 2 to the following effect:—"Provided that nothing in "this Act contained shall authorize any governing body to pro-"mote any Bill in Parliament for the establishment of any gas or "water works to compete with any existing gas or water company "established under any existing Acts of Parliament." This still leaves non-statutory companies open to attack, who require protection as much as those with special Acts. A further amendment was made by striking out from clause 3 the words "containing a "population of less than 5000 inhabitants." By this alteration the direct consent of owners and ratepayers in any district must be obtained before expenses can be legally incurred. Thus shorn of the highly objectionable provisions which the Bill originally contained, and hedged round with safeguards, the passing of the Bill might be contemplated without much alarm. It would, however, be an unnecessary, and possibly a mischievous, addition to the Statute Book, and we still hope for its withdrawal. The struggle it has had, and the almost complete failure sustained, is not likely to encourage its promoters to make further efforts in the same direction.

Many rumours are afloat as to the successors of the present Metropolitan Gas Referees, and the names of several gentlemen are given either as actually appointed or as likely to be appointed. In the absence, however, of the official announcement, which, so far as we can learn, has not yet been made, we shall not add to the reports abroad. It is satisfactory to find prevailing a very general acquiescence in the propriety of the step taken by the Board of Trade. The objectors seem unable to comprehend the question involved, and are evidently in ignorance of the real position of affairs. The main question is whether the referees are to be a *permanently* heavy charge on the metropolitan gas companies. We have always urged that it was never intended that they should be, and the Board of Trade are of the same opinion. They were called into existence to determine, mainly, three points; but, excluding for the moment the burner question, we are now in exactly the same position as we were in 1868. As regards the sulphur question, the letter of Mr. Harris, which we publish in another column, shows that all that has been put forward with so much ostentation was perfectly well known to a practical gas maker before referees were appointed, and it is on record that the gas of the Great Central Company did, on the average, in 1868, contain less sulphur than is now fixed upon as the maximum. Mr. Harris might perhaps be asked to explain how it happened that the sulphur in his gas suddenly reached such large proportions, which continued until recently; but the fact remains that in 1868 the works of the Great Central Company were a model as regards sulphur purification, and an intelligent study of the process there would have settled the "sulphur question" three years ago.

As regards the maximum of 15 grains of sulphur for Bow and Beckton, which, we are told, was announced by the referees, in a letter to the Corporation of London, but of which, we are informed, no notice was sent to the company concerned, we have no hesitation in expressing a strong opinion that it should have been 20 grains. Seeing that every excess renders a company liable to a serious penalty, and also that the mean amount, taking a monthly, or even a weekly mean, may be very far below the maximum, and remembering further the uncertainty (dependent on several causes) which attends the lime process of purification, it would have been better to allow the gas companies a fair latitude, and then they could have been rigorously fined for any

excess. As it is, the limit fixed upon is likely to give rise to many appeals to the Chief Gas Examiner, whose task will be a difficult one under the circumstances.

The burner question referred to above, and which, as we said in our last, has not been settled to the satisfaction of everybody, is very likely to be reopened as soon as new referees are appointed. The Corporation of London have never been satisfied with the test burner, "inasmuch," they contend, "as it is quite "unfit for general use, and educes from the gas an illuminating "power far beyond that which can be obtained by the ordinary "consumer." The special objections alleged in a correspondence just published are that the burner is so near its smoking point, that the least draught causes it to flame and smoke; that in a perfectly still atmosphere the smoke from this is far larger than from any other burner; that an increase in the pressure of 0·03 of an inch, not a tenth of that constantly occurring, will cause it to flare above the chimney; that, although it throws a very large quantity of light at right angles, so as take effect on the photometer, it throws downwards a larger shadow; that the cost of the burner is such as to stand in the way of its use by the majority of consumers; and lastly, that, as a fact, the adoption of this burner has caused the consumer to be supplied with a poorer gas than when the prescribed illuminating power was 14 candles. In reply to this, the referees have said that "the burner in ques- "tion is very largely used in shops, in factories, and also in private "houses, and that they have had ample opportunities of judging of "it, and they regard it as a burner which perfectly fulfils the "requirements of the Gas Act of 1868 and 1869." The correspondence on this subject, we believe, was not completed when the present referees received notice that their appointments would not be renewed. The matter will, no doubt, be very early forced upon the attention of the new referees, so at present we shall not further allude to it.

As we expected, no opposition is made by the Metropolitan Board of Works to the amalgamation of the Western Gas Company with the Gaslight and Coke (Chartered) Company, and the Board of Trade may be expected to give their sanction to the scheme immediately.

The difficulties of the Corporation of Ryde are fast increasing. For the moment they are complicated by the action of Mr. G. W. Stevenson, whose bill of particulars is printed in another column. The trial, we are informed, will come on at the Guildford Assizes, which were opened yesterday, so this matter will soon be disposed of. The larger question whether or not the Corporation shall complete the purchase of the gas company under the award will not be so easily decided. The Local Government Board, it seems, are willing to grant a Provisional Order empowering the Corporation to borrow money for the purpose, but inasmuch as the Order is vigorously opposed by the Ratepayers Association, it will not be possible to get a confirmatory Act this session. Thus the matter will have to remain as it is for the present, and we must wait to see what, if any, steps will be taken to upset the award. But we feel bound to say at once that the ratepayers of Ryde have not dealt fairly with the Corporation. They were at one time clamorous for the purchase of the gas company, and it was in deference to their opinion that the Corporation went to arbitration. Now, however, that the ratepayers have found it impossible to get the gas undertaking at their own price, they turn round on the Corporation and oppose in every possible way the completion of the bargain. This, to say the least, is very mean behaviour, which in the long run may bring the town into far greater difficulties than now obtain. If it should be found impossible to set aside the award, the ratepayers must pay, and the opposition and their subscriptions to a "ratepayers "association" will be so much trouble and money thrown away. Would it not be better for them to quietly accept the situation, and do their best to make the gas undertaking a profitable concern to the Corporation? Such would be a far more sensible course than the costly and embarrassing one they are now pursuing.

The North British Association of Gas Managers have just held their Eleventh Annual Meeting, at Perth. We hope to give full reports of the valuable papers read, in early issues. Such communications as that by Mr. Alexander, on "Shale as an Auxiliary "in the Manufacture of Coal Gas," have an especial value at the present moment; and the lecture by Dr. Stevenson Macadam, on "The Employment of Paraffin Oil in the Manufacture of Coal "Gas," will be looked forward to with interest. We are glad to see that the Northern Association are to meet their Southern brethren at Edinburgh, next year.

We continue to receive notices of advances in the price of gas. In the metropolis the Commercial Company have given notice that from the 1st of the present month the price will be raised from 3s. 9d. to 4s. This announcement has given rise to some agitation in the east of London. At a meeting of the Huddersfield Town Council, reported in another column, it was agreed to raise the price 2d. per 1000 instead of 4d., as recommended by the Gas Committee; but even this rise is scarcely justifiable until their reserve-fund has been partially exhausted. At Carlisle and at Prescot the price has been advanced 6d. per 1000 feet. At Calne the price has been raised to 5s. The Risca and Pontymister Gas Company give notice that from the 1st of October next no discounts will be allowed, and the price of gas will be 6s., which is practically a rise of 1s. per 1000. At Bury the Gas Committee for the present content themselves with an advance in the price of coke, and so do the Maidstone Gas Company.

We insert a letter from Mr. George Anderson reiterating his opinion that there is nothing new in the reports of the gas referees on ammonia and on sulphur purification. In a postscript which we do not insert, Mr. Anderson denounces personal attacks couched in vulgar terms, and quotes Byron to the effect that "of all cants "in this canting world, the cant of criticism is the most contemp- "tible." Mr. Anderson should remember that it was his own criticism, conveyed in no measured terms, which provoked the defence we inserted in our last.

We hear that Dr. Odling and Mr. Keates have finished the investigations undertaken at the request of the Patent Gas Company, and that their report may now be shortly expected. In the meantime, a curious question may arise from the amalgamation of the East Barnet, Barnet, and Potter's Bar Gas Companies. The Patent Gas Company have contracted to keep the gasholder of the first-named company full, presumably for the supply of the district of that company; but if the mains of the three amalgamating companies are connected, and only the works at East Barnet retained, the patent gas will be available for the united districts. Whether this is in the bargain or not will be seen by-and-by. If the Patent Gas Company now carry on the manufacture at East Barnet at a loss, that loss must necessarily be increased; but the rentals show that the increase will not be very large.

Nothing shows more clearly the rapid recovery of France from the crushing blow received in the Prussian war than the report of the European Gas Company we publish to-day. At Amiens and Rouen, two of the occupied cities, the restoration of prosperity is now complete—in the former city, indeed, business is said to have been more than usually active. So far as the company is concerned, it seems that but for a considerable loss on exchanges their profits would very nearly equal those of their best year. The coal question is, of course, the difficulty of the future.

Correspondence.

GAS PURIFICATION.

SIR,—In the paper which I read before the Gas Managers Association this year, on the purification of gas from ammonia, I criticized the report of the London gas referees on ammonia purification, published in the JOURNAL OF GAS LIGHTING in August last, and in doing so I employed these words: "I beg to state that there is no fact or recommendation in their report that is not well known to many gas engineers, and has not been acted upon in the construction of gas-works; and from the published reports of the proceedings of this society all that is good in their report may be found." And I referred to the paper which I read before the society in 1867, and quoted from it the same principles of purification which the referees now advise as improvements which they recommend for adoption in the London gas-works under their surveillance.

We have since been favoured with another report from those gentlemen on the purification of gas from sulphur, meaning sulphur in other forms than that of sulphuretted hydrogen, in which report they speak thus: "It appears impracticable at present to entirely exclude carbonic acid from the purifiers; but the referees are of opinion that the detrimental action of this element might be lessened by adopting a *new* system in working the purifiers—namely, by keeping (say) the two first lime purifiers in each house in action, not merely until they become 'foul,' but until the carbonic acid has expelled the sulphuretted hydrogen and taken its place."

Such a system of purification may be new to the referees, but it is not new to gas managers; nor is it the best that can be, and is, adopted in many gas-works. As an example of what is done in many gas-works, I will state my own practice.

I employ three, or in some cases four purifiers; the valves and connecting-pipes are so arranged that the gas is introduced first into the foulest purifier, and on in succession till it issues from the cleanest purifier, whatever may be the position of each purifier in the system. The term "first purifier" has, therefore, no meaning in the construction of the works, but only in their management afterwards. The mode of working the purifiers is to not change the first, or foulest purifier till we have a foul test at the outlet of the third, or it may be at the outlet of the second, according to the season of the year and other circumstances. By doing so, the gas has been passing through the first purifier all the time until the second and third purifiers have become foul, and the chemical change pointed out by the referees as advisable is continually taking place, and thus not only the "two first purifiers," but all the purifiers, in their turn, perform the same function.

I know that in many gas-works where the business done has gone ahead of the apparatus, managers are compelled to change the lime

before it has become foul in the sense I speak of; but such a contingency must not be spoken of as the normal condition of working, and the practice of the profession, where the apparatus is large enough for the business to be done, and the practice which we all adopt when we have sufficient apparatus must not be written about as a *new* one.

One thing is certain, too—that purifiers so worked give out much less smell than purifiers that are changed as soon as they give a foul test by acetate of lead; the lime is not so active, it has absorbed so much carbonic acid from the gas that it has less power to absorb it from the air, and the oxidation, so rapid in the latter, does not take place in the former case but with a very feeble power, and hence the lime has little or no smell.

I have frequently asserted, and I here repeat it, that gas can be purified by lime with much less smell to the neighbourhood than by oxide of iron, provided that both ammonia and carbonic acid are held back from the purifiers by efficient washing and scrubbing by ammoniacal liquid and clean water.

If I have misunderstood the referees, I shall be sorry for it, and will be glad to be put right; but as I understand those reports, they merely confirm principles that have been adopted in all well-designed modern gas-works.

London, July 21, 1872. GEORGE ANDERSON.

THE HYDRAULIC MAIN.

SIR,—May I ask a small portion of your valuable space for the following extract from a paper on "Improvements in Hydraulic Mains for Gas-Works," read before the Royal Scottish Society of Arts, Edinburgh, on the 9th of May, 1870, by Mr. George Pratt Boyd, manager of the gas-works, Alloa:—

The hydraulic main, as is well known, is the reservoir, or large pipe, on the top of the retort-bench for collecting the gas from the retort dip-pipes. It is, so far as I have been able to ascertain, made round or D shaped. It is generally kept more than half full of water, or rather tar (the water giving place to the tar as it comes along with the gas from the retorts), for the purpose of sealing the ends of the dip-pipes, which are carried down into the tar to the depth of from 1 to 3 inches, according to what the engineer may think safe. By the ends of the dip-pipes being sealed in the tar a perfect joint is formed, and a self-acting valve of the most perfect order, as by it the gas is kept in the hydraulic main, and cannot escape back into the retort while it is open and being charged or into any of the retorts that may not be in use at the time. An alteration in the shape of the hydraulic main might be made to some advantage. Instead of being a round or D-shaped pipe, it might be an oblong-shaped chest, with an arc of a flat circle from the bottom of the sides, so as to allow of a hollow 2 inches clear from the bottom of the dip-pipes, which would form a kind of gutter for the tar to remain in, and leave enough of space for the gas to pass in leaving the dip-pipes. There is no use in having 8 or 10 inches of tar always in the hydraulic main. It serves no good purpose, so far as I can see, but adds weight on the retort-bench, and is a useless tar-well.

The excellent paper on this subject, read by Mr. Livesey at the last Managers meeting in London, and the valuable practical results therein stated as being obtained by his adoption of the method so clearly explained by Mr. Boyd in 1870, must be gratifying to both. While I have no doubt that Mr. Livesey's improvements were gone into without any knowledge of the above extract from the published paper, and while, so far as I am aware, he is thoroughly entitled to the credit of being the first to put in practice the important modifications therein recommended, I think I may claim, and Mr. Livesey will admit, that Mr. Boyd deserves the credit of being the first to publish the ideas now so successfully carried out in London.

D. BRUCE PEEBLES.

Fountainbridge Works, Edinburgh, July 27, 1872.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JULY 15, 1872.

The WALLASEY IMPROVEMENT Bill was returned from the Commons, with the amendments agreed to.

TUESDAY, JULY 16.

The BURY IMPROVEMENT AND WATER, and the ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT Bills, were read a third time, with the amendments, passed, and sent to the Commons.

THURSDAY, JULY 18.

The following Bills received the Royal Assent:—BOLTON CORPORATION; BRIDPORT WATER; HINDLEY LOCAL BOARD (No. 2); BRIGHTON CORPORATION WATER; WARWICK LOCAL BOARD WATER; NOTTINGHAM AND LEEN DISTRICT SEWERAGE; HAWORTH LOCAL BOARD OF HEALTH; KEIGHLEY WATER; DARLINGTON IMPROVEMENT; and WALLASEY IMPROVEMENT.

TUESDAY, JULY 23.

The TONBRIDGE GAS Bill was returned from the Commons, agreed to, with amendments. The said amendments were considered and agreed to.

The BURY IMPROVEMENT AND WATER, and the ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT Bills, were returned from the Commons, with the amendments agreed to.

The following Bills received the Royal Assent:—The BURY IMPROVEMENT AND WATER; ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT; and the TONBRIDGE GAS.

HOUSE OF COMMONS.

MONDAY, JULY 15.

WALLASEY IMPROVEMENT Bill.—The Lords amendments were agreed to.

The BARNET DISTRICT GAS AND WATER Bill was reported from the Select Committee on Standing Orders.

TUESDAY, JULY 16.

THE WATER SUPPLY IN THE SOUTH OF LONDON.

Colonel NORTH asked the Secretary of State for the Home Department whether, considering the report made to the Lambeth Vestry on the 4th inst., by Dr. M'Cormack, medical officer of health for the Lambeth district, that on the 18th of June he examined the water of the Lambeth Company, and also that of the Vauxhall Company, with results showing but very slight improvement in the water supplied by the Lambeth Company, and that the water of the Vauxhall Company continued to exhibit the same degree of impurity as it did the previous month, some means cannot be adopted, either by fine or otherwise, to oblige the Vauxhall Company to furnish pure water.

Mr. CHICHESTER FORTESCUE: I believe it is more in my province than in that of the Secretary of State to answer this question. I should like to explain as to the last part of the question, as to the powers of the Board of Trade to take steps, by fine or otherwise, to oblige the Vauxhall Company or any other company to provide pure water, that the whole extent of our power is this—that if a company shall be proved to have furnished impure water, or an insufficient supply of water, as has been the case lately at Bermondsey, the Board of Trade can serve a notice on that company to remove the cause of complaint; and if reasonable means are not taken to remove the ground of complaint within a week of that time, the Board of Trade can then, but not until then, proceed before a court of law to recover penalties. Those are the powers of the Board of Trade. But with regard to the facts of this case, they do not exactly tally with the allegations in the question. I have not seen the report of Dr. M'Cormack to the Lambeth Vestry, but I have before me the report of the water examiner to the Board of Trade for the month of June, and I shall soon have the report for the month of July. In the report for June it is stated that the water supplied by the Vauxhall Company on the 10th was clear and bright, and that the water supplied by the Lambeth Company on the 10th and the 15th of June was on both occasions clear, but insufficiently filtered, the present filtering-beds being insufficient, but that means are being taken by the company to remedy that defect, though that will take some time. I find also that there is a report of Dr. Frankland to the Registrar-General in the latter part of the month of June, in which he says the water supplied by the companies in London is of fair quality, with the exception of that supplied by one company—namely, the East London—and including that of the two companies mentioned in the question of my honourable friend. The remaining companies deliver clear and bright water, and therefore, as far as that evidence goes, I hope the water is better than is presumed by the honourable member's question.

THURSDAY, JULY 18.

The TONBRIDGE GAS Bill, as amended, was considered.

METROPOLIS WATER ACTS.—TRANSFER OF POWERS OF THE BOARD OF TRADE TO THE LOCAL GOVERNMENT BOARD.

In committee on the Public Health Act, on clause 32, which provides that the powers and duties of the Board of Trade under the Alkali Act, 1863, and any enactment amending the same shall, be transferred to and be exercisable and performed by the Local Government Board,

Mr. KAY-SHUTTLEWORTH moved to insert after the word "same" the words "and under the Metropolis Water Acts, 1852 and 1871." The effect of the amendment, he said, would be to transfer to the Local Government Board the powers now vested in the Board of Trade with regard to inspection as to the quantity or quality of water supplied to the metropolis; and also of making regulations with regard to a constant supply. These were all matters relating to the health of the inhabitants of London. The Board of Trade was not so well adapted to carry out the provisions of the Acts for the supply of water as the Local Government Board was. Moreover, the duty of the Government in regard to the supply of water to the inhabitants of London was a duty altogether connected with health, and not at all connected with trade. It was true that an inquiry was now proceeding under the Metropolis Water Act of last session under the Board of Trade, but that inquiry would only last for a short time, and there was no reason at all why it should not be continued under the authority of the Local Government Board. When a dearth of water arose in any part of London it was more proper that the Local Government Board should make inquiries into the cause of that dearth and other matters connected therewith than the Board of Trade.

Mr. CLAY: I do not rise at all to oppose the motion of my honourable friend. I have the greatest confidence in the Local Government Board. Having been connected for a great many years with metropolitan water companies, I confess that I would as soon be under the Local Government Board as under the Board of Trade. But I should like to ask my right honourable friend the President of the Board of Trade how this would affect the inquiry which is now going on under the authority of the Board of Trade.

Mr. STANSFELD: The amendment merely transfers the superintendence from one Government department to another.

Mr. CRAUFURD: I hope the Government will not agree to this amendment. The state of things is this: By the Act of last year certain inquiries were to be made by the Board of Trade, and certain matters were to be decided by them; and it has always been supposed that the Act of last session gave sufficient authority to the Board of Trade to carry on those inquiries. Accordingly, at the commencement of this session, regulations having been made by the companies in accordance with the provisions of the Act, the Board of Trade appointed a commission of inquiry, and the Board of Trade having made objections to these regulations, an objection was made that the court had no authority, and that the Board of Trade had no power to conduct the inquiry unless they sat themselves to conduct it. The matter was referred to the law officers of the Crown, who gave their opinion that the objection was valid. The result was that a Bill was hurried through Parliament for the purpose of giving the Board of Trade the requisite powers. That bill passed a few weeks ago, and under it the Board of Trade appointed a new commission to sit and inquire. That commission is now sitting, and the proposal of my honourable friend is to transfer the powers under the Act of 1871, without taking the slightest notice of the Act of 1872 with reference to the making of any inquiry. Now it may be right to transfer these matters from the Board of Trade to the Local Government Board, but it is not fair that anything should be done without notice to the water companies, who have had no notice of this amendment. And I say still further, even if it should be the opinion of the House that such a transfer should be made, it should not be made till the inquiry that is now being made under the authority of the Board of Trade, acting under the provisions of the special Act of Parliament, has been brought to a close. I hope, therefore, that the Government will not agree to this amendment, especially as the water companies have not been informed that it would be brought forward. If it should be persevered in I shall certainly feel inclined to take the sense of the House on the subject.

Mr. CAWLEY: I wish to call the attention of the President of the Local Government Board to the necessity of other words being inserted beyond these, because I am quite sure that it would not be right to interfere with the inquiry that is already going on. I think some words should be introduced so as to save that inquiry.

Mr. STANSFELD: My impression is that no words would be required. I have no wish to interfere with the inquiry that is going on, and I think it would be very unreasonable to entertain the idea.

Mr. CRAUFURD: Then I hope my right honourable friend will not accept the amendment. If the amendment be passed, I shall move that the chairman report progress. I move that the chairman report progress.

Mr. STANSFELD: I hope my honourable friend will not persist in his motion. The only object of the amendment of the honourable member for Hastings is to place the Local Government Board in the position of the Board of Trade in this matter; that is the sole end and effect of the amendment. In reference

to the pending inquiry, I will undertake, if this amendment is accepted, to introduce any words into the report to satisfy honourable members that the pending inquiry shall proceed just as if there were no such amendment. I think my honourable friend ought to be satisfied with that.

Mr. CRAUFURD: I cannot agree to withdraw my motion. My point is this, that after the expense to which the companies were put after the passing of the Act of 1871, these changes should not be made. It is not a question merely of the pending inquiry. If it be necessary to make this change, let it be done on notice, and let it be done by the Government.

Dr. LYON PLAYFAIR: My honourable friend, the member for Ayr, has said nothing against the principle of this amendment; he has simply said that the companies have not had notice. Why, they have had the same notice that all others persons have. This amendment has been for some time on the paper, and if they had looked at the paper they would have had the same notice that other persons have had. The only objection is that it may have some effect on an inquiry that is now pending, but that inquiry is simply as to the regulations in reference to certain provisions of the Act of last session, and will go on perfectly well whether this amendment is passed or not. I hope, therefore, that the House will not accept the motion to report progress.

Mr. R. N. FOWLER: It seems to me that the object of the honourable member for Ayr is to divide against the amendment of the honourable member for Hastings.

The CHAIRMAN then put the motion to report progress, and declared it negatived.

Mr. CRAUFURD said he challenged the decision twice.

Mr. MONK said, sitting near the honourable member for Ayr, he distinctly heard him challenge the decision of the chairman.

Mr. DORSON said he was watching what took place, and unless his ears entirely deceived him the honourable member for Ayr did not challenge the decision of the chairman.

Mr. LOCKE: I represent a borough, a great part of which has nothing to drink—(laughter)—that is nothing in the shape of water. The question is whether or not a better board can be created for the purpose of regulating this matter with regard to the water companies of the metropolis. The Government have acceded to the amendment of the honourable member for Hastings, and I hope the honourable member for Ayr will withdraw his motion and give the House an opportunity of voting on the amendment of the honourable member for Hastings.

Mr. CLAY: I am sure I may calculate on the courtesy of the committee while I contradict the statement of my honourable friend who has just sat down. It is impossible for me to be angry with anything that the honourable member states, but if it were possible I should be angry with such a statement as he has just made, for it is quite impossible that he should have any information which can justify it. I will not detain the House half a minute while I state what the real circumstances are. The exact fact is this, that for three days—the 13th, 14th, and 15th instant—the Bermondsey district was somewhat insufficiently supplied, but with that exception there has been no deficiency whatever. When I state that for some years I have been chairman of the company, the House will give me credit for having made every possible inquiry; and I state from my own knowledge, from information supplied to me by my engineer, who has made a house-to-house inquiry, that there is no house in the district in which there is any deficiency either in quantity or quality.

Mr. COLLINS suggested that the motion to report progress should be withdrawn, in order that the committee might divide on the amendment.

Mr. CRAUFURD: Before the committee divides I wish to make some observations on what my honourable friend, the member for Southwark, has stated. If it were proposed by the amendment of my honourable friend, the member for Hastings, to give greater power than is given by the Act of 1871, there might be something in it; but what is proposed is simply to give to the Local Government Board the power now vested in the hands of the Board of Trade, there being an inquiry now going on under the authority of the latter body under the provisions of the Act of last session. Under these circumstances, I hope my right honourable friend will not accept this amendment now, but that he will let the matter be discussed on the report, so that in the meantime the question can be brought before the companies, and they may have the opportunity of consulting with the right honourable gentleman on the subject. My honourable friend (Dr. Lyon Playfair) says we have had as much notice as any one else. If it had been a notice by the Government, that would have been notice sufficient; but surely a notice by a private member was no notice that the amendment would be accepted by the Government. Under these circumstances I hope the right honourable gentleman will let this matter stand over, and be settled on the report.

Mr. DIMSDALE: If the Government had thought the change which will be effected by this amendment a proper one, they would have introduced it themselves. As they have shrunk from that responsibility, I hope the House will not sanction this amendment, which has been introduced by a private member.

Colonel BERESFORD: I hope the House will agree to the amendment. It is quite clear that the power of making regulations with respect to water supply should be handed over to the Local Government Board.

The committee then divided on Mr. Kay-Shuttleworth's amendment—

For the amendment	193
Against it	16
Majority for the amendment	177

The clause was then amended accordingly.

MONDAY, JULY 22.

BURY IMPROVEMENT AND WATER BILL, and ROCHDALE BOROUGH EXTENSION AND IMPROVEMENT BILL.—The Lords amendments were agreed to.

The TONBRIDGE GAS BILL was read a third time, and passed, with amendments.

The BARNET DISTRICT GAS AND WATER Bill was read a second time, and committed.

The PUBLIC HEALTH AND LOCAL GOVERNMENT Bill (Sir C. Adderley's) was withdrawn.

TUESDAY, JULY 23.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

The House having gone into committee on this bill,

Sir MICHAEL BEACH said he must oppose the further progress of the measure, unless its promoters would agree to the 6th clause being expunged. This clause had a retrospective effect, and gave authority to the Secretary of State or the Local Government Board, on a memorial being presented to him by any local governing body, to authorize the payment out of the borough fund or the local rate of expenses incurred previous to the passing of the Act.

Mr. LEEMAN said he was fain to accept that condition.

The clause was then struck out, and the bill passed through committee.

WEDNESDAY, JULY 24.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

On the report of amendments to this bill, which was brought up after a quarter to six, when, by the rules of the House, only unopposed bills are taken,

Mr. CRAUFURD said he opposed the bill.

Sir M. H. BEACH: I hope the honourable member will not persist in his opposition. It was understood that the bill should be allowed to pass if the 6th clause were struck out.

Mr. CRAUFURD: I was no party to the compromise, and I oppose the further progress of the bill.

Mr. LEEMAN: May I be permitted to say one word?

The SPEAKER: As the bill is opposed, the order must be postponed.

The order was then postponed.

FRIDAY, JULY 26.

THE MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

On the report of amendments to this Bill,

Mr. LEEMAN moved to add at the end of clause 1 (which gives an interpretation of terms), a proviso that in the borough of Cambridge the term "governing body" shall mean the Board of Improvement Commissioners, and not the Council of the Borough of Cambridge.

The motion was agreed to.

Mr. LEEMAN next moved to make an amendment in clause 2. The clause provides that when in the judgment of a governing body it is expedient for such governing body to promote or oppose any local and personal bill, or bills, in Parliament affecting the district of the governing body, it shall be lawful to apply the borough funds to that purpose. The amendment was to leave out the words "affecting the district of the governing body."

The amendment was agreed to.

Mr. LEEMAN then moved to add the following proviso at the end of clause 2:—"Provided, that nothing in this Act contained shall authorize any governing body to promote any bill in Parliament for the establishment of any gas or water works to compete with any existing gas or water company established under any Act of Parliament."

The proviso was agreed to, and added to the clause.

Mr. LEEMAN then moved an amendment in clause 3. The clause enacts that the costs of promoting a bill, or bills, shall have the sanction of special meetings, and provides that no governing body of any district containing a population of less than 5000 inhabitants shall take any proceedings under this section without obtaining the consent of the owners and ratepayers. The amendment was to leave out the words "containing a population of less than 5000 inhabitants."

This amendment was likewise agreed to, and the bill was then ordered to be read a third time.

Legal Intelligence.

VICE-CHANCELLOR'S COURT.

FRIDAY AND SATURDAY, JULY 26 AND 27.

(*Before Vice-Chancellor* BACON.)

THE ATTORNEY-GENERAL *v.* THE CORPORATION OF BIRMINGHAM.

The SOLICITOR-GENERAL, Mr. KAYE, Q.C., and Mr. RODWELL appeared for the Gravelly Hill relators; Mr. EDDIS, Q.C., for Sir Charles Adderley; and Mr. AMPHLETT, Q.C., and Mr. PEARSON for the Corporation of Birmingham.

These were informations filed at the relation of certain inhabitants of Gravelly Hill, near Birmingham, and by Sir Charles Adderley, M.P., to restrain the Corporation of Birmingham from committing a nuisance by carrying on sewage works at Saltley. An injunction was granted at the hearing of the cause, which injunction was not to be put in force till November last. In January of the present year the court refused to entertain an application of the corporation for an extension of time. During the present session of Parliament the coporation promoted a bill in Parliament to enable them to carry out a scheme for the disposal of the sewage of the town. This bill, after a lengthened inquiry, passed the committee, but was rejected by a narrow majority in the House of Commons upon the third reading, at the instance of Sir Robert Peel and Sir Charles Adderley, who alleged that their property would be injuriously affected by the steps proposed to be taken by the corporation.

The SOLICITOR-GENERAL now moved on behalf of the Gravelly Hill relators that a commission of sequestration might issue against the council for disobedience to the order of the court, "to sequestrate the personal estate, and the rents and issues and profits of the real estate of the defendants the Town Council of Birmingham, until the further order of the court; and that the said defendants might be ordered to pay to the plaintiff the costs of the application."

After hearing the arguments on both sides,

The VICE-CHANCELLOR said he had been impressed with the difficulty which the Town Council were under in reference to the abatement of the nuisance, but that difficulty did not appear to be insuperable. When the case was before Parliament a number of schemes were proposed, from which it was evident that something might be tried by the defendants with a fair prospect of success. But nothing effectual had yet been commenced, notwithstanding the long interval since the rejection of the bill by Parliament. Under these circumstances he was opinion that the sequestration ought to be granted, but he would direct that the order should not be put in force until the second seal in Michaelmas term.

WORCESTERSHIRE ASSIZES—NISI PRIUS COURT.

FRIDAY, JULY 19.

(*Before Justice* QUAIN.)

WESTLEY *v.* THE SOUTH STAFFORDSHIRE WATER-WORKS COMPANY.

Mr. HUDDLESTON, Q.C., and Mr. MOTTERAM (instructed by Mr. Warmington) appeared for the plaintiff; and Mr. MATHEWS, Q.C., and Mr. JELF (instructed by Mr. Wainwright), for the defendants.

This was an action brought by the plaintiff, brassfounder, Queen's Cross, Dudley, to recover the sum of £250, for damage done to his property through the negligence of the company's servants, and £20 3s. 10d. which he had paid out of his own pocket in repairs.

Mr. HUDDLESTON, in opening the case, stated that the plaintiff was at the time a director of the Dudley Water-Works Company. In 1860, under the power of an Act of Parliament, this company became incorporated with the South Staffordshire Water-Works Company, which supplied many towns in South Staffordshire with water. By the powers conferred upon the defendants they were empowered to purchase the whole of the undertaking of the Dudley Water-Works Company, and became responsible for the whole of the works. The defendants would not, therefore, be able to say that it was the Dudley Water-Works Company which was liable.

Mr. *Chas. Henry Westley*, the plaintiff, stated that he lived at Queen's Cross, Dudley. Formerly he was a director in the Dudley Water-Works Company, and was now a small shareholder in the South Staffordshire Water-Works. In 1859 he erected four houses, at a cost of about £1200, in Queen's Cross. The Dudley Water-Works Company laid down the service-pipe to supply water to the houses. Two or three years afterwards the ball-cock of the cistern got out of order, and he sent for Mr. Scott. This was after the incorporation of the Dudley Water-Works Company with the South Staffordshire Water-Works. Mr. Scott, who was in the defendants employment, repaired the ball-cock. He said that he could do away with the cistern, as the defendants would give a constant supply of water. At that time the kitchen, foundation, and cellars were quite dry, and they continued so up to the winter of 1866. In 1867 the tenants complained of the garden ground being very wet, and he again sent

for Mr. Scott. He took Mr. Scott into the lower kitchen of No. 3 house to see the water in the ashpit. He drew his attention to the fact that the water was oozing through the walls, and said there must be a very considerable leakage of water. The other houses were much the same. Mr. Scott, who took charge of all the plumbing and repairing the company required to be done in Dudley, said it could not be the company's water. He instructed Mr. Scott to find out the leakage, and said he should be quite willing to pay the ordinary and proper charge. He told him it must be the company's water; but Scott said he did not think it was, and that it might come from the sewer, or was surface water. Witness observed that if he would turn off the water at the main he could soon ascertain whether it was the company's water. In May, 1867, some time afterwards, he again complained, and called his attention to the fact that there was an overflow of hard water into the soft-water cistern. He made a drain, but it did no good. The damp increased, and between that time and 1869 he sent for Mr. Scott four or five times, and he made examinations. Upon one occasion the engineer of the company made an examination with Scott, and he said it was not the company's water. About May, 1869, when the matter had become more serious, he again sent for Scott, and told him that his property was being greatly damaged, and he must insist upon his finding out the leakage. In about half an hour Scott told him that he could not find out the leakage, but that the stop-cock was an old one, and he had better have a new one put in. He gave Scott the order to do the work, and paid for what was done. He again asked him to turn off the water at the main, and then he would see whether or not it was the company's water, but Scott held a strong opinion that it was not the water which the company supplied. The damage considerably increased, and soon afterwards his tenants drew his attention to the fact that the outer wall had subsided and bulged out. An examination of the foundation was made by Mr. Marsh, an architect, and it was found that the clay under the walls was so soft from the action of the water that a finger could be pushed into it. In 1870 he had the floor taken up, but up to 1872 the damage continued to increase. In February, 1872, he went into one of the houses, and saw the water running through the front wall and the kitchen. He again sent for Scott, and told him he must find out the leakage. At length he turned off the water at the main, and directly he did so the water ceased to flow. When Scott saw this, he said there must be a leakage somewhere. He then followed the pipe, and within about 2½ feet from the stop-cock he found the leakage. He said it was a very faulty pipe, that at some time it had been stopped with a wooden plug, and that the plug had been wearing away. No one had ever done anything to the pipe but Scott or the defendants servants. When he communicated with the company the secretary said no doubt the leakage caused the damage, but that the defendants were not responsible for it. Witness said he did not want to go to law, and the secretary said perhaps the company would recognize his claim. His claim was—money out of pocket, £20 3s. 10d., and damage to the property, £250. The real damage he had sustained in the difference in the selling price of the property was at least £450.

In reply to Mr. MATHEWS, *witness* said that the service-pipe was his own. He was not aware that the Dudley Water-Works Company was not wound up. He was not aware either that there was another hole in his service-pipe, caused by the lead being eaten away. The premises were in the neighbourhood of a colliery, but he did not attribute the cracking of the outer wall to mining operations. In 1865 he employed a man named Thompson to alter the service-pipe.

William Exall, who was formerly in the plaintiff's service, confirmed the statements made by Mr. Westley.

Mr. *Richards*, surveyor, of Dudley, said he visited the plaintiff's houses in February last, and he had no hesitation in saying that the water did not come from the sewers. Scott, who was present, said the pipes had been badly put in, and that it was a bungling job.

Some discussion having taken place between the learned judge and the learned counsel, it was agreed that a verdict for the plaintiff for a nominal amount should be given, and that the question of the liability of the defendants for the default of the Dudley Water-Works Company, and the question whether there was any default on the part of this company, should be left to the decision of an arbitrator, who would have power to assess damages. Some points of law were reserved.

BACUP PETTY SESSIONS.

WEDNESDAY, JULY 24.

(*Before Captain* AITKEN, *Chairman, and a Bench of Magistrates.*)

SERIOUS CHARGE AGAINST A GAS SUB-MANAGER.

Henry Alfred Wadman, late sub-manager to the Rossendale Union Gas Company, Cloughfold, was charged with having, on the 13th of July and other days, committed wilful damage to the gas-works of the above-named company, to an amount exceeding £5, to wit, £10.

Mr. WATSON, of Bury, appeared for the prosecution, and Mr. J. H. TATTERSELL for the defence.

Mr. WATSON, in opening the case, briefly stated the facts, the details of which are contained in the subjoined evidence:—

Mr. *William Blackledge*, first called, said he was appointed the manager of the Rossendale Union Gas Company in March, 1870. The prisoner had been sub-manager of the works for about nine months, and was stationed at Cloughfold, the place for the manufacture of gas, whilst the store which he attended to was at Bacup. The prisoner was understood to be responsible for the management of the works at Cloughfold during his absence. He had the power and authority over the persons employed there, and had to see that they discharged their duties. On Friday, the 12th of July, he perceived that the gasholders were very low, and could not assign any reason for it, which showed either a greater consumption or an escape. He did not see the prisoner then, but sent down word to keep extra fires up in order to supply a sufficient quantity of gas. On Monday week last the prisoner told him he had made five charges instead of four, and thereby had been able to get through. On the Saturday morning, about six o'clock, he observed that there were about seven sheets of gas, which, according to the usual consumption, would be sufficient to carry him over to the Monday, provided that the retorts were kept at work. But on the Monday, about ten o'clock, he perceived that the gasholders were low, and asked the prisoner how he went on on Saturday evening and Sunday, and he said he had not been able to get through. The amount of gas which would escape on Saturday evening would be between 60,000 and 70,000 cubit feet of gas, which was less than the quantity there ought to have been on the Monday morning. Joseph Handley, on Monday last, went to witness and pointed out two plugs, 3 inches in diameter, situate in the purifying-house, and also other plugs, one in the store-room and the other on the top of two valves. The one in the store room was half an inch in diameter, and those on the valves one inch. The value of the total amount of gas which had escaped otherwise than by consumption, 63,259 feet, at 4s. 3d. per 1000, was £13 8s. 7d.

Joseph Handley said he entered the service of the Rossendale Union Gas Company about three months since as the head stoker, and was employed under the prisoner. On Saturday, July 13, at eleven o'clock at night, he was in the meter-house of the company, at Cloughfold. It was his duty to be on the premises all night. He noticed the "hands" on the dial turning wrong way, which would indicate that gas was passing the wrong way, and that it was passing away both by consumption and escape. He thereupon went to Wadman, the prisoner, who was standing beside one of the purifiers. He (witness) could hear that gas was rushing out of the plug-holes, and asked the prisoner what he was doing, to which he replied that he was lowering the holder, and he should blow the calico weaver away; he said he had taken out two plugs, and witness could see them on the top of the purifier. Witness saw nothing more there. He had heard the prisoner refer to Blackledge as being only come from a calico factory, and he therefore referred to Blackledge when he said he would blow the calico weaver up. Witness said to him, "For God's sake what are you doing? You'll ruin me and all of us. Put in the plugs and stop them up." The prisoner then put in the two plugs. The two plugs on the top of the purifier were, as near as he could guess, 3 inches in diameter. The whole of the pressure was on, as the exhauster was not working. Before he saw the plugs out he had noticed the quantity of gas in the holder, and after he had seen the plugs put in again he noticed that the holder had been lowered four or five sheets, though the consumption at that time was not going on as much as at an earlier hour by one-twelfth, and it was not sufficient to account for the lowering of the quantity in the holder. The plugs were out the greatest part of an hour. On the same night, about half-past eleven o'clock, which was before he had put the plugs back, but, after he had taken them out, witness went with the prisoner into the store-room, and he saw him take an half-inch plug out, and was ordered by him to keep it out until four in the morning. The removal of the plug caused a large escape of gas, but as soon as the prisoner had gone witness put it in again. After that was done, witness subsequently fetched a gallon of beer into the retort-house, by the prisoner's order. He heard prisoner order Mauls to charge five times instead of four, though four was the usual number of charges for the night; by so doing it would make one-fourth more gas than usual. On Thursday night, the 11th of July, about eleven o'clock, the prisoner went to the retort-house, called witness out, and took him to the valves in the dry well. He unscrewed two plugs, and ordered him to keep them out until between four and five in the morning; the diameter of those plugs was about one inch each, and in consequence of their removal there was a great rush of gas through the holes, and that which escaped was absolutely wasted and lost. The pressure was all on, and the gas escaped with great violence. About half an hour after the prisoner had left him he put the plugs in again; the prisoner had previously left the key with him to obey his directions; he also told him to take the plugs out on the following night (Friday) in the same way that the prisoner had taken them out, after everything was still, and keep them out until four or five in the morning. Witness told him it was not right, but he said he would make Blackledge put on those fires (meaning two fires recently knocked off); he added that Blackledge was trying to injure him, but he would try to throw Blackledge out; that Mr. Blackledge was showing the company that he could make gas cheaper by the absence of those fires. Henry Maul was present, and saw the two plugs taken out on the 11th of July. Prisoner told him (witness) that he must not say anything to Mr. Blackledge about the matter. The effect of the removal of the plugs was to cause a great loss to the company. On Saturday night the amount of gas lost was between four and five sheets; he could not tell how much gas was lost on the Thursday night. Witness knew that in consequence of the escape of gas the supply was nearly lost for the district. The plugs were not put there for the purpose of allowing an escape of gas.

Henry Maul said he was the stoker at the Rossendale Union Gas-Works. On Thursday night, the 11th of July, he saw the prisoner remove two 1-inch plugs from the inlet and the outlet of the well between nine and ten at night, the consequence of which was a larger escape of gas through each plug. On the following Saturday, the 13th of July, witness was acting as stoker on the same premises, when the prisoner sent for a gallon of ale for him. Prisoner told him to make five charges that night, which was one more than usual. Witness saw no plugs out on Saturday. He was not able to tell what quantity of gas escaped on the Thursday night.

Captain *Aitkin* said he was the chairman of the directors of the Rossendale Union Gas Company. Mr. Blackledge was the manager, and up to Tuesday last the prisoner was sub-manager. The two witnesses were also in the service of the company, and were under the direction of the manager and sub-manager. On the 4th of July the board had called upon the prisoner to resign his situation, and his term would have expired on Thursday, August 2, but he wished to give up on Saturday, July 27, 1872, to which he (Captain Aitkin) assented. On Saturday, July 13, the prisoner called at his office, and stated that he feared he should not be able to produce a sufficient quantity of gas to keep the district lighted during Saturday night if the consumption were as heavy as it had been during the previous night, and that if the supply failed he would not be held responsible, as he was carrying out the directions of Mr. Blackledge. Witness told him he couldn't hear of the district being in darkness, and if it was necessary, he must put extra charge in, and he would be responsible for deviating from the orders of Mr. Blackledge. It was not in the province of the prisoner to remove plugs as detailed by the previous witness. The effect of such removal would be a very large waste of gas, and that quantity would be very much increased by the extra pressure which was on in consequence of the exhauster being stopped and under repair. He believed the calculation of loss made by Mr. Blackledge would be about correct. If by any chance a spark had come into communication with the gas which was escaping, the result would have been a fearful explosion.

Police-sergeant *Joseph Taylor* spoke to apprehending the prisoner on Tuesday night, at seven o'clock.

This concluded the case for the prosecution, and on the prisoner being interrogated as to his defence, said he would reserve it. He was then formally committed to take his trial at the next Preston Quarter Sessions.

Mr. TATTERSALL made application for bail, which the bench agreed to accept, on condition that two sureties of £100 each be provided, and the prisoner himself be bound in the sum of £200.

CHEPSTOW COUNTY COURT.

(*Before J.* M. HERBERT, *Esq., Judge.*)

TUESDAY, JULY 16.

CHEPSTOW GAS AND COKE CONSUMERS COMPANY *v.* HENRY HUGHES.

Mr. JAMES EVANS appeared for plaintiffs, and Mr. J. L. BALDWYN for defendant. The action was brought to recover £31 11s., balance of an account for gas, consumed at the residence of the defendant, Castleford, near Chepstow. £24 18s. had been paid into court, and defendant also pleaded a set-off of £2 10s. for expenses incurred in attending the Gloucestershire Quarter Sessions to obtain permission for the company to lay their pipes across the Chepstow Bridge. The amount of gas consumed was not disputed, the only question at issue was as to the price, and the amount in dispute was £6 13s.

Mr. EVANS, in opening the case, said the action was brought by the complainants to recover £29 1s., the cost of gas and rent of meter supplied to the defendant. The company was incorporated by Act of Parliament, but their district did not extend further than Chepstow Bridge. For many years the company had been trying to induce the magistrates of Monmouthshire and Gloucestershire, at the quarter sessions, to allow pipes to be laid on and over the bridge. The Monmouthshire magistrates had consented for some time; and, with the assistance of Mr. Hughes, they eventually secured the consent of the Gloucestershire gentlemen. The company then laid down their main into Gloucestershire, the defendant attaching his private pipes, and in 1870 the gas was put on in his new mansion, no agreement being made as to price.

After the quarter ending June, 1870, an account of £1 17s. 6d. for gas, at 5s. per 1000, and 3s. for rent of meter, was sent in, and eventually paid by the defendant. When the next account was sent in, defendant refused payment, on account of being charged 5s. per 1000, although he had been told by the secretary from the first that the charge would be 5s. He now claimed a set-off for £2 5s., for expenses to Gloucester; this charge, however, was never made until Mr. Hughes was informed that proceedings would be taken to recover the debt.

Mr. *Henry Boulton*, the secretary and manager to the company: I entered their service in November, 1869; the pipes were then being laid across the bridge. Mr. Hughes met me there, and said he wished a supply of gas for his house. We afterwards had some correspondence in reference to the laying down of pipes from the main to Mr. Hughes's house, which is about 200 yards from the main; it ended by Mr. Hughes laying them down himself. The gas company supplied the meter, and I saw it fixed. Mr. Hughes is burning the gas now. I never entered into any agreement with Mr. Hughes as to the price of gas. At the end of June, 1870, I sent in an account as follows:—For gas £1 17s. 6d., and rent of meter 3s. This account was paid. I afterwards called on the defendant for payment of other accounts, when he refused payment, saying he ought to be charged the same as the people of Chepstow. I told him that it was the general custom to charge extra out of the district, and the directors would not supply him for less than 5s. per 1000 feet. The meter at defendant's house is a 20-light one, and 3s. per quarter is the usual rent. There are only two customers on that side the bridge, the defendant and Mr. Jones; the latter paid 5s. per 1000 for 15 months. I have been employed by several gas companies, and the general rule is to charge extra out of the district.

Cross-examined by Mr. BALDWYN: I succeeded Mr. Parlby. I am at liberty to make contracts, subject to the approval of the directors. If the directors did not approve of my contract, it was my duty to acquaint the contracting party of the same. I never made any contract with Mr. Hughes as to the price of gas, except that during the time the pipes were being laid down I told him the directors would be sure to charge 5s. per 1000.

A letter was read from Mr. Boulton to the defendant, which stated that they could not charge less than 5s., enclosing the account, asking for cheque, and offering to sell the meter at cost price—viz., £4 4s.

His HONOUR stated that a verbal contract would not extend over twelve months, and, there being no written agreement, if the defendant used the gas he must pay the price charged.

In answer to further questions, Mr. *Boulton* said the balance of account up to June, 1871, was £17 17s. He received a cheque for £15 12s. for payment, Mr. Hughes deducting £2 5s. for expenses to Gloucester. He returned the cheque to the defendant.

His HONOUR said this was an admission on the part of the defendant as to his liability for 5s. per 1000.

Mr. BALDWYN, for the defence, said: In 1867 Mr. Hughes commenced exerting himself to induce the magistrates at quarter sessions to permit the laying down of water and gas pipes across Chepstow Bridge; and in 1868 he received a letter from Mr. Parlby, the former secretary to the company, asking him to attend Gloucester sessions, which, he did, and succeeded in obtaining the required consent.

Mr. *Henry Hughes*, examined by Mr. BALDWYN, said: In 1868 I received a letter from Mr. Parlby, asking me if I should require gas in my house. A day or so after I met him at the new buildings, and after some conversation as to bringing up the gas, I asked him the price, and he said 4s. per 1000.

His HONOUR intimated that there appeared to be no defence, for if this verbal agreement had been made, it would now be invalid. As regards the expenses to Gloucester, there seemed to be no promise on the part of the company to pay such. Judgment would therefore be for the plaintiffs for the full amount claimed, with costs.

The full claim was £31 11s., of which £24 18s. had been paid into court, thus leaving a balance of £6 13s.

HUDDERSFIELD COUNTY COURT—FRIDAY, JULY 26.

(*Before Mr.* HOMERSHAM COX, *Judge.*)

MARTIN *v.* DAWSON.

This was an action to recover the sum of £5 2s., for money paid by the plaintiff to the use of the defendant. It was argued on the 19th instant, the facts being admitted, and judgment was reserved till this day.

His Honour said: The plaintiff is the defendant's landlord, who showed repayment of water-rent supplied by the Huddersfield Corporation to Mrs. Dawson. Mr. Martin being the owner of the adjoining house, and the service-pip running through his house to the one occupied by the defendant. The water rent had been estimated by the rateable value of each house separately. As there was an agreement between the parties as to the supply of water, he thought there must be an acceptance of the ordinary arrangement as accepted between landlord and tenant under the local Acts then in force. Under the Huddersfield Water-Works Act, 1845, there was provision directly applicable to the present case, and section 24 of that Act directs that where several houses occupied by several persons, are supplied by one common service-pipe, the several owners or occupiers shall be liable in the same way as if the water was supplied by a direct service-pipe. It was clear from the previous sections of this Act, and also from the 81st section of the earlier Act of 1827, that the tenants or occupiers were to be liable to pay the water-rates. No doubt they might by special agreement shift that liability to the latter, but in the present case not one word was said about water-rent when the house was let to Mrs. Dawson, and therefore it seemed an irresistible inference that the plaintiff impliedly accepted the ordinary liability to pay the water-rent. The form of the claim was for money paid, and it was urged that Mr. Martin had paid the water-rent for Mrs. Dawson's house spontaneously, and not at her request, and that in order to sustain an action of this kind there must be a request on the part of the defendant, but the law implied that after such a request to the plaintiff he might pay the money under protest of law. The Huddersfield Water Act of 1869, section 72, creates a primary liability on the part of the owner, and he was relieved from inquiring whether there was any liability on the part of the landlord prior to 1869. Because the plaintiff was willing to abandon his claim against the defendant for water-rent that had accrued before that time, that was no reason why he should abandon it after the passing of the Act of 1869. There would, therefore, be a judgment for the plaintiff for the amount claimed for the water-rent accruing since the passing of the Act of 1869, and which he (plaintiff) had paid to the corporation on behalf of the defendant.

IN ARBITRATION.

(*Before* JAMES FARRAR, *Esq.*, *Arbitrator.*)

WEDNESDAY, JULY 17.

HANDLEY *v.* BURY AND RADCLIFFE WATER-WORKS COMPANY.

On Friday, the 28th ult., Mr. *William Handley*, landlord of the Derby Hotel, Bury, sued the Bury and Radcliffe Water-Works Company for the sum of £34 4s. 8d., "being the amount overcharged, and wrongfully charged, by the defendants, for water supplied by the defendants to the plaintiff, from the 30th of September, 1869, to the 30th of September, 1871, and which sum had been overpaid by the plaintiff to the defendants." The case was brought before Sir John Iles Mantell, Bart., and a special jury, at the county court, counsel being engaged on either side; but on the suggestion of the chairman of the water company, it was agreed to submit the matters in dispute to the arbitration of Mr. James Farrar, civil engineer, that gentleman to give his decision within a month. The inquiry commenced this day. Mr. DODDS, solicitor, of the firm of Messrs. George Whitehead, Son, and Dodds, represented the plaintiff; and Mr. S. WOODCOCK, jun., of the firm of Messrs. Samuel and S. Woodcock, solicitors, appeared for the defendants.

Mr. DODDS having at some length stated his client's case, called

Mr. JOSEPH WOOD, gas manager, who said that he had kept a register of Mr. Handley's water-meter indications for some time back. [Witness handed in a copy of the register referred to.] In July, 1871, he discovered an extensive leakage of this meter. On the 18th of that month, Mr. Handley called him in to ascertain whether there was anything wrong with his water-pipes. They closed the stop-cock outside the house, and shut off all the taps, so that no water could pass through the pipes. They then listened, and heard a great rush of water, showing that an escape was going on.

Mr. WOODCOCK: We don't dispute the leakage.

Mr. DODDS: Do you dispute the amount claimed?

Mr. WOODCOCK: Certainly, we do.

Examination continued: As near as he could estimate the waste on the 30th of July, 1871, it would be about seventy gallons per hour, and at that time not a drop of water was passing into the pipes of the Derby Hotel. On the following day the leakage was repaired by the company's servants. From the registers he kept, Mr. Handley's average consumption was under 50,000 gallons per quarter.

Cross-examined by Mr. WOODCOCK, *witness* said that he undertook to look after Mr. Handley's meter at that gentleman's request. He had no remuneration for his trouble, nor did he look for any. He denied that he was a partisan; he merely performed the task as a friend, and intended to do it gratuitously. He had had leakages in gas-pipes, but they were different from water-pipes. Could not mention a particular case in which an abatement had been made to consumers for what had actually passed through their meters. Had not seen the fracture in Mr. Handley's meter, and could not say where it was situated. Some settling in the ground might have fractured the pipe, and caused the leakage. He assumed that the leakage was the same in all the quarters.

Re-examined: There could be no settling of the ground, the meter being placed under the pavement.

Mr. WILLIAM HANDLEY, the plaintiff, said up to 1869 he paid for water upon his gross annual assessment. In that year the company altered their mode of supply. They put down a meter under the footpath, over which he had no control, being outside his premises. After the meter was put down in December, 1869, his first quarter's bill came to £9 18s. 2d., which was nearly three times as much as he paid before. In consequence of the increased charge, and knowing that he had not been using more than usual, he remonstrated with the company. Two meters were then put down, one for the house and another for the yard and stables. It was afterwards discovered that the supply for the town-hall and police offices had been going through his meter, and before this was rectified he was put to a great deal of trouble. He objected to pay £1 14s. per quarter in addition to the meter scale, and went before the board of directors, considering he had no right to be so charged. One quarter's rent was paid by his wife without his sanction or authority. There was no pretence for saying that he used the water but for the ordinary use of an hotel. The company threatened to stop his supply altogether if he did not agree to their terms. The supply for the town-hall and the police offices was separated on the 1st of July, 1870. When the leakage was discovered it was close to the meter—perhaps within five or six inches. Gave information to the company, and was informed that if the leakage was discovered to be on his side he would have to pay, if on theirs they would repair it. From time to time he had declined to pay the company's claim, not being satisfied with its justice. He only paid them what they were fairly entitled to. After several threats to deprive him of water, the secretary came with a man, who carried a key. He then paid the claim, but under protest, as he could not carry on his business without water. Since the leakage was stopped the consumption of water had been considerably reduced. Had never at any time given his servants instructions to use more or less water.

Cross-examined: Considered that hotel keeping was a trade.

Mr. DODDS: A very profitable one, too.

Mr. WOODCOCK: Well, as my friend Mr. Dodds has put it, it is a very profitable trade.

Witness: I keep a few hackney carriages, and put up other people's carriages when they come. I have a large commercial custom, and likewise a large circle of public friends, in addition to a numerous staff of servants. I went to consult Mr. Dodds on the 20th of May, 1870. When the company proposed to put down another meter to see how much water went to the town-hall and police offices, I objected; and Mr. Milne was against it, too, for, said he, "I will put a stop-tap on the other side, and use as much as I like."

Commissioner *Booth* deposed that he saw Mr. Handley's meter at the time of the leakage. The leak took place at the soldered joint, and the water was spurting out in three different directions. In his opinion, the leak was caused through careless workmanship. The leakage could not be less than 70 gallons per hour. The fracture was under the flagging of the public footpath, at the side of Mr. Crompton's wall, which had given way very materially, as indicated on the plan. He had no hesitation in saying that the leakage was the cause of the wall giving way.

By the ARBITRATOR: The leakage was not more than 6 inches from the meter.

Mr. *Ralph Crompton*, draper, Fleet Street, deposed that his wall had given way, and that the hinges of a door in it were broken through the leakage, which had been going on for at least 18 months. The wall was now unsafe.

Mr. *Joseph Woodcock*, plumber, deposed that he had worked for Mr. Handley ever since he had occupied the Derby Hotel, and also for his father before him. Had examined the water arrangements of the hotel, and there was no more water used than was absolutely required. All the pipes were in good order. He examined the pipes along with Mr. Whitworth, the water company's plumber. Considered that Mr. Handley was charged for more water than what he used. Only examined the pipes inside the hotel.

Cross-examined: We lay the pipes inside, and allow the company to connect them to the meter. The pipes were laid when Mr. Charlton came.

Mr. *Hugh Birch*, landlord of the Boar's Head Inn, deposed that he had had several notices from the water company. In 1869 the company put down a meter without his sanction. He paid two quarters, but refused to pay more. He was a shareholder in the company. Mr. Scholes, one of the directors of the water company, told him that if paid half they would "square up."

Mr. S. WOODCOCK, jun., then replied. He contended the pipes were under the causeway, and belonged to Mr. Handley. He quoted the company's rules and regulations, showing that they undertook to lay down and maintain within the public streets, at their own cost, the lead or other service-pipes extending from their mains to the outer edge of the causeway of the premises to be supplied, and where their mains were under the causeway, next the property requiring such supply, the owner would be charged the whole of the cost. Injury from frost, or the damages beyond fair wear and tear, must be repaired by the company at the expense of the parties using them. If from any cause a meter ceased to indicate correctly the quantity of water passing through it, the company were entitled to charge for the supply according to the average consumption for the month succeeding the date upon which such meter was exchanged, the quantity so ascertained to be considered as having

passed through the meter. No one knew who laid down the pipe, but he took it for granted that the owner of the property had done so, having the company to connect it. It was not until Mr. Handley consulted his solicitors that he discovered the company were overcharging him. Mr. Handley claimed discount, but no tradesman ever allowed discount off a bill unless the party paid the entire sum. He asked the arbitrator to compare Mr. Handley's evidence with that of Mr. Crompton, and he would find that the leakage had only been going on for six instead of 18 months.

The arbitrator adjourned the inquiry until he had personally examined the meter, pipes, &c.

At the sitting of the County Court, on Friday, July 26, the Registrar produced the decision of the arbitrator in this case, which the learned judge approved, and ordered to be entered on the records. The decision was to the following effect:—"Verdict for the plaintiff for £25 4s. 3d., to be paid by the defendants, with costs, including the plaintiff's attorney's charges and the costs of the arbitration and references, and my costs, amounting to the sum of £10 17s. 6d."

CLERKENWELL POLICE COURT.—Friday, July 19.

(*Before Mr.* Barker, *Magistrate.*)

Francis Clayton, aged 42, lately a collector in the employ of the Imperial Gaslight and Coke Company, John Street, Bedford Row, was charged on remand, before Mr. Barker, with embezzling the sum of £300 and other moneys belonging to his employers.

Mr. Cox, of the firm of Messrs. Willoughby and Cox, the solicitors to the company, attended for the prosecution; and Mr. Ricketts for the defence.

Mr. Cox having opened the case at some length, and detailed the facts as given in the evidence below,

Mr. Ricketts said he was instructed to throw no obstacle in the way of the prosecutors, for the prisoner was now prepared to plead guilty, and to take the judgment of the court. He had written a letter to the company stating that he was guilty; and though he had got out of the way at first, it was to see if he could not raise the amount of his defalcations, but afterwards his intention was to commit self-destruction. He might state that the defendant had been 19 years in the employ of the company, 14 years of which he had acted as collector, and £20,000 annually had passed through his hands. He had a large family, and therefore he hoped the magistrate would deal with the case, and not send it for trial.

Mr. Barker said he did not think, when the Legislature passed the Act enabling justices in petty sessions to deal with charges of embezzlement, that it was intended for them to decide cases to the extent of this.

Mr. Cox said his instructions were to leave the matter in the hands of the court, and not to take the initiative.

Mr. Ricketts said it was plain that there was no wish to deal harshly in the matter, and therefore he hoped the magistrate would deal with the prisoner.

Mr. Barker said the sum of money embezzled was far too large for him to decide the case, and therefore he should allow the case to proceed.

Mr. *Field*, chief cashier of the company, said the prisoner had been in the employ of the company as one of the collectors, at a salary of £330 per year. It was the prisoner's duty to pay into the company's bankers each morning the money he had received the day before. One day each quarter an audit was appointed, and it was the collector's duty to attend that audit. On the 27th, 28th, and the 29th of June last, the total amount received by the prisoner was £530 11s. 6d. If these moneys had been received on the 29th they should have been paid in on that day. The strict rule was that the money received one day should be paid into the bank the next, but no notice was taken if the money was paid in three times a week. The audit was on the 31st of June, and any money he received after four o'clock on the previous Saturday he should have paid to the company's cashier at the office, before the audit in the afternoon. On the previous Saturday afternoon the prisoner received two sums after bank hours, but he did not account for it to the cashier. On Wednesday, the 3rd of July, he (witness) received by post the cheque produced on the Birkbeck Bank for £300, which was drawn by the prisoner, and which had been dishonoured, the prisoner at the time having only a balance at his bankers of 8s. 2d.

By Mr. Ricketts: The prisoner entered the company's service in 1853, and 14 years of that time he had been a collector. During that time about £20,000 a year had passed through his hands, and he had reason to believe that the prisoner had accounted for the whole of that money; in fact, at the end of every quarter the prisoner handed in a list of all those that had not paid, and that list had invariably been found correct.

The letter the prisoner had written was put in, read, and appended to the depositions.

Mr. *Overstall*, chief cashier of the London and Provincial Bank, Islington branch, produced a slip of paper in the prisoner's handwriting, showing that he paid into the bank £530 11s. 6d., and on that slip was the entry of a cheque drawn by the prisoner for £300 on the Birkbeck Bank, which was dishonoured.

Mr. *Hill*, clerk in the Birkbeck, proved that on the day the prisoner drew the cheque for £300, he had but 8s. 2d. in that bank.

Inspector *Usher*, E division, proved that the defendant went to the Bow Street Police Station, and asked if there was a warrant out for his apprehension for embezzlement, whereupon he was taken into custody; and in the course of conversation he said he ran away with the intention of committing suicide.

Mr. Ricketts said the prisoner would reserve his defence, whereupon

Mr. Barker committed the prisoner to the Middlesex Sessions for trial.

ROCHESTER POLICE COURT.—Guildhall, Tuesday, July 23.

CHARGE OF STEALING WATER.

Edward Burrell, of Union Street, Troy Town, the owner of a number of small tenements in Delce Road, appeared to answer an information charging him with having illegally taken a quantity of water from a pipe belonging to the water-works company not placed for the gratuitous use of the public.

Mr. R. Prall, solicitor to the water-works company, prosecuted

Defendant said he objected to any magistrate who was a shareholder in the concern, adjudicating in the case, but it appeared that none of the magistrates on the bench held shares in the company.

Mr. Prall said the defendant had previously been before the bench for refusing to pay the water-rates for the houses belonging to him in Delce Road, which were ordered by the corporation to be supplied with the company's water, in accordance with the Act. The defendant, however, refused to pay the rates, and the water was then cut off, the defendant then opening one of the company's lofts placed to supply some other houses, and giving his tenants water from that. Under the circumstances he would ask the magistrates to inflict the full penalty.

Mr. *Heckford*, secretary to the company, said the corporation had given notice that they would no longer be answerable for the payment of the water-rate for defendant's houses, and therefore the supply had been cut off. There was a tap in an adjoining yard to supply twelve houses belonging to another landlord, which defendant had no right to use.

Evidence was then given to prove that the defendant went to the tap in the adjoining yard and turned on the water, which the tenants of the houses carried away in buckets.

The defendant said the water had been improperly cut off, and the women of his houses stung him about it like a lot of wasps. When the adjoining houses were out of water he supplied them with it, and he did not see any harm in his taking some from their tap, and he maintained that he had a perfect right to do so.

The magistrates convicted the defendant in a penalty of £3, and £1 5s. costs, and in default two months imprisonment.

The defendant strongly refused to pay the fine and costs, which were ultimately defrayed by a friend in court.

Miscellaneous News.

EUROPEAN GAS COMPANY, LIMITED.

The Annual General Meeting of the Shareholders of this Company was held at the Office, No. 11, Austin Friars, London, on Wednesday, July 17—W. White, Esq., in the chair.

The Secretary (Mr H. McL. Backler) read the notice convening the meeting also the report of the board of directors, of which the following is an abstract:—

Amiens.—The manufactures and trade of this town, which had been severely affected by the prolonged occupation of the Germans, have now completely recovered the prosperity of former times, and business has been more than usually active.

The new gasholder is not yet completed, but your directors are urging the contractors to bring it into action at the earliest possible period.

Boulogne-sur-Mer.—This town, having become a place of refuge, during the war, for great numbers of persons prevented from residing in the invaded provinces, did not gain materially by the conclusion of peace, especially as passport regulations, now happily abolished, deterred many English families from resorting there, for the bathing season, last summer.

The reconstruction of the gas-works required by the municipality, had also some effect on the operations of the company, which could not be carried on with customary regularity during this state of transition.

The alterations are now approaching completion, and a marked improvement in the returns may soon be expected.

Your directors have availed themselves of opportunities to purchase sufficient land, contiguous to the works, for all extensions likely to take place during the concession.

Caen.—For some time past your directors had been anxious to establish the interests of the company in this town on a more satisfactory basis than the contract, then within a few years of its termination, appeared to afford; but great caution was necessary to avoid attracting the attention of competitors ever ready to dispute the ground of a profitable undertaking.

At last, when the municipality appeared desirous of suppressing oil lighting, and extending the use of gas to all parts of the town, the occasion appeared favourable. A negotiation consequently took place, during which serious difficulties had to be overcome, but it ended in an extension of the exclusive privilege to the 31st of December, 1907; the consideration being an immediate reduction in the price of gas, and the laying of new mains in the streets not previously so supplied.

This enlargement of the company's business will, it may be reasonably expected, soon compensate for a reduction of rental, which in similar instances has invariably proved to be temporary only.

Havre and Ste. Adresse.—The prospects of this station are highly promising, and the new quarters of the town are being rapidly covered with buildings.

Nantes and Suburban Districts.—A comparison of profits is advantageous to the period now under consideration on account of the operations of the previous year having embraced the lighting of large workshops for the manufacture of implements of war, then carried on, but discontinued as soon as peace appeared probable. The general business of the company here, is, however, gradually increasing.

Rouen, Sottevills, and Suburban Districts.—Here, as at Amiens, the rebound after the depression caused by the German occupation of these two important cities, has exceeded the expectations of your directors, and the results are highly satisfactory to the company. This station was originally constructed on leasehold land, and frequent attempts had been made by the present management to obtain the freehold, but variously complicated interests were involved, and it was not until four months ago that your directors succeeded in concluding the purchase. At the same time an additional lot of land, immediately opposite the works, was acquired from the same vendors, and payment for the whole is to be effected by instalments spread over nine years.

Summary.—It is a remarkable fact that the profits have, immediately after the war, attained an amount which your directors could not have ventured to anticipate.

The high price of coals, which was referred to in a previous report, has hitherto been nearly covered, in the aggregate, by the greater value of secondary products, but this can hardly be expected to continue. Your directors hope, however, by a judicious use of French coals, to reduce considerably the effect of the extra charge, and contracts, by means of which the supply is assured for nearly twelve months forward, are a sufficient guarantee that the disturbed state of the coal market will not be felt by this company to its full extent.

The interest on debentures is being reduced to the uniform rate of 5 per cent., as old bonds fall due, and are renewed or replaced.

In conclusion, your directors call attention to the eminently satisfactory position of the company, whose entire property is now more firmly secured than at any previous period; the whole of the land on which the stations are situated being freehold, and the shortest of the contracts, by which the exclusive privilege of lighting six of the most important cities of France, is guaranteed to the company, having yet 34½ years to run. The prospects of increasing business are also highly encouraging.

Bearing in mind the continued rise in the cost of coals, labour, and all materials, your directors have resolved to recommend the payment of a dividend at the rate of 8 per cent. per annum, together with a bonus of 2 per cent. Notice has been given that two of your directors (Walter Thomas Fawcett, Esq., and Thomas Chaloner Smith, Esq.), and both auditors (William Jones Lewis, Esq., and George Harrison, Esq.), retire from office at this meeting, but, being eligible, will be proposed for re-election.

The Chairman: Gentlemen, in presenting to you for adoption the very favourable report which has been just read, I may say that the result of the last year's working far exceeds our most sanguine expectations. We had, indeed, no right to expect so much at this early period, but since we last met your circumstances have become so altered that, if it had not been for the difference of £1138 in the exchanges, which were against us in remitting money home to this country, we should have been in a position to show an amount of profit within £7 of the very best year of the company's business—viz., the year before the late war took place. Such being the case, if I were to talk for an hour I do not think I should be able to say anything more satisfactory to the shareholders than has already been stated to them in the report, which, I need hardly add, is perfectly satisfactory to the directors. Of course I cannot say to you that I expect, nor would I guarantee, that the cost of coals for the coming year, will be recouped, or anything like recouped, by the receipts for the residual products, as in the past year. Coals have risen so enormously in price that, though we have made the provision stated in the report, still we cannot expect that the results will be quite so satisfactory in this respect as they have been. The report has stated that we have to look forward to a possible increase in the price of labour, and a very large increase in the price of iron, as well as in all the other materials which are essential to the maintenance of gas-works. These things have for some time past been rising in value to a very great extent, and no human foresight can venture to tell how, when, or where this advance will come to an end. That it will stop some day—I cannot say what day—there is no doubt. I may state to you that during the 23 years I have been a director of this company the lowest price we have given for coal was 4s. 9d. per ton at Newcastle, and the highest price, previous to the present crisis, was 7s. 6d., and that at this time the price asked for coals on board ship is 14s. per ton. But, as I said, this state of things must come to an end. Well, gentlemen, this is rather a shady side of our affairs, but, on the other hand, we have fair prospects of obtaining better prices for coke, tar, and ammoniacal liquor. I think I told you on a former occasion that we were taking measures to convert some of these products into articles of commerce, by which means we expect to increase the profits of the concern, and I have no doubt we shall realize better

returns for these things. I need hardly say to you, after hearing the report, that as a company we were never in a better position than we are at the present day; and looking at all the circumstances of the case, I believe we shall come out not very badly at the end of the current year. But we must act prudently. It has always been our maxim here to look forward to what may possibly take place, and therefore in considering this matter the board recommend on the present occasion the rate of dividend referred to in the report. You will have seen, with regard to our debentures, that we never stood in a more satisfactory state than we do at this moment. Two of the objects mentioned in the report we have been long anxious to achieve, and have been watching an opportunity for years to accomplish—viz., the extension of our Caen concession, and the purchase of the freehold at Rouen. The importance of these matters was always present to our minds, but had we shown our anxiety to discuss them we might have failed, whereas by adroitly seizing the opportunity when it offered we have accomplished all that we desired, and I have no doubt all that you desire. It will perhaps be expected that I should say something about the state of France; but you will get more information on that subject in the public papers than I can give you. I will only say that after the frightful convulsions of the past two years that splendid country is again prosperous in its trade and manufactures, and is eager to cover from its own resources the anticipated loan of £140,000,000. I think, taking these things into consideration, we may augur favourably for the future, and, as far as we are concerned, look for better days than we have ever seen, provided we act as we have always done hitherto, with prudence, and turn our opportunities to the best account, which we have always heretofore endeavoured to do. In conclusion, gentlemen, I need hardly remind you how much all of us, shareholders and directors, are indebted to the unremitting care and foresight of our esteemed secretary, Mr. Backler. During the last two years of unprecedented troubles in France he has successfully devoted all his experience and energies to the maintainance of the various existing interests which we have at our different stations. The directors, at a recent board meeting, passed a very complimentary resolution, thanking Mr. Backler for his great exertions, and at the same time asking him to accept a service of plate of the value of £200. In doing so the board felt that they were not only expressing their own estimation of the services of the secretary, but also those of the shareholders at large. With these few remarks I will move—"That the report now read be received and adopted."

Mr. FAWCETT seconded the motion.

Mr. HUGGINS: With respect to the purchase of the freehold property in France, are we within the law in the steps which have been taken?

The CHAIRMAN: Certainly.

Mr. HUGGINS: I presume you have ascertained that as an English company we are able to hold freehold property in France?

The SECRETARY: Yes; beyond a doubt.

Mr. HUGGINS: You refer in the report to a considerable outlay of money for the purchase of land at one of the stations, which you state will be payable by instalments spread over a number of years; but the report does not state anything like the actual amount, nor has the chairman in his observations made any allusion to the sum which is to be expended there.

The CHAIRMAN: With respect to the first question, it is not at all likely people in France would sell us freehold property at long credit unless we had the right to hold it; nor is it likely our legal advisers—we have one in each town we supply—would counsel our entering upon a bargain which would be good for nothing. As to the second question, I may state that the sum for which we have agreed to purchase the freehold is £12,000. We have hitherto held the property only on lease, and this has been always a matter of considerable anxiety to the board. We felt that it was much to be regretted that our predecessors should have built large works, and laid out immense sums of money on leasehold property. We have long watched our opportunity to obtain the freehold, and, as soon as it arose, we availed ourselves of it. In order that this acquisition should not bear too heavily on our present funds we have agreed to spread the purchase money over a number of years.

Mr. HUGGINS: I gather, then, from you that we are about to increase our capital account £12,000, and I infer that you propose to deal with that sum, not as capital, but to charge revenue with it. Now I submit that to take a portion of our income for a certain number of years, and apply it to such a purpose is not legitimate, and I feel sure that it needs only to be pointed out to prevent such a perversion of our funds.

The CHAIRMAN: We do not propose to pervert your funds. The facts of the case are these. The tenure upon which this station was held was leasehold, and this was always a great anxiety to the directors. We were paying a large rent for the property, which was held upon a renewable lease. We have done away with that, and instead of paying the whole amount of the purchase money at once, we have spread it over a number of years. During that time we shall charge in the accounts 5 per cent. on the sum of money which is not paid, until the several instalments are due.

Mr. HUGGINS: Interest on the money of course comes against revenue, but I do protest against revenue being applied to pay off a capital charge, when we have capital on the new shares which is yet uncalled.

The CHAIRMAN: We are not taking capital out of revenue.

Mr. HUGGINS: We are quite right in making due provision for the future, but, while exercising a due regard to the interest of posterity, we must not lose sight of the rights of present investors. I protest against current income being charged for the benefit of posterity.

The CHAIRMAN: We evidently do not understand each other. First of all you ask whether we are going to take this £12,000 out of earnings. I reply that we are not going to do anything of the sort, but as we have spread the payment of this money over nine years, which we believe to be the most convenient course, we take interest on it at the rate of 5 per cent. out of our profits.

Mr. HUGGINS: Where is the £12,000 to come from?

The CHAIRMAN: It will be raised by debentures or from shares.

The SECRETARY: The £12,000 will be paid by annual instalments. As each instalment is paid it will be debited to capital. The manner in which that capital will be provided remains to be decided at some future meeting of the directors. At present no provision is made, for the reason that even the first instalment is not yet due.

A PROPRIETOR: Why not make a call upon the new shares?

The SECRETARY: Because we do not want the money for this purpose.

Mr. BADDELEY: I understand the position of things to be this: We held property under a lease for which we had to pay a rent. We have now made arrangements to purchase the freehold, the cost of which is payable by instalments. The rent, therefore, will cease, but as long as any portion of the purchase money is unpaid, we shall charge ourselves with 5 per cent. interest out of revenue. That is a perfectly legitimate arrangement.

A PROPRIETOR: I presume when the first instalment is due, the shareholders will have an opportunity of deciding how the money shall be raised?

The CHAIRMAN: This is a question which, I think, it is a great pity to raise at this meeting, because after all we, as directors, have the management of your affairs and we have always endeavoured to do so to the best of our ability. With regard to raising £12,000 we are certainly in a position to do that, especially as it is spread over nine years, and there is no necessity whatever to make provision now for what we shall do nine years hence.

A PROPRIETOR: May I ask whether we are bound by our concessions to supply gas at a certain price?

The CHAIRMAN: We are bound by our concessions to a fixed price for gas, and even if coals rise to double or treble their present cost we cannot exceed that price. I should, perhaps, further explain that the supply by us of gas at a rate agreed upon is the price we pay for the exclusive privilege we enjoy. We therefore take the risk whether we are able to supply it at a profit or not.

The motion was then put and carried unanimously.

Mr. HUGGINS: I think we have great cause to congratulate ourselves upon the present state of the company's affairs. Here is a balance-sheet to which I have no hesitation in saying no other company in England can in any way approach. We have a share capital of £304,000, and debenture bonds amounting to £93,000, in round numbers a total capital of £400,000, against which we have a sum put aside for depreciation equal to 50 per cent. of the whole, and we have contracts unexpired ranging over 34 or 35 years. If that is not satisfactory I do not know what is.

The CHAIRMAN: Then why make a question about our raising £12,000?

Mr. HUGGINS: I have fought the battle of the new shares before now, and am prepared to do so again, because I am quite satisfied that the money for this purchase should be provided by calls upon these shares and not out of revenue. But I was saying that such a sum as 50 per cent. for depreciation is, as far as my experience goes, unapproachable. And then we have, as the accounts show, something like £7000 carried over, after providing for a dividend of 10 per cent. upon the whole year. I hope and trust that during your time you, supported by your brother directors, will chalk out some course by which we shall take the full benefit of this state of prosperity. At the same time I may add, that I trust 10 per cent. will be our maximum dividend, because, as I said some years ago, 10 per cent. is a rate which is never questioned, whereas 12 per cent. might be open to observation.

The retiring directors and auditors were then re-elected.

Mr. FAWCETT, in returning thanks, said it might be interesting to the shareholders to know that during the last few weeks he had been over the whole of the stations of the company. He had inspected them on previous occasions with much satisfaction, but he must say that his recent visit was most thoroughly gratifying to him, and he thought it right the shareholders should be so informed. The stations were in the most perfect order, and in such a position as they never were in before.

Mr. CHALONER SMITH said he was greatly obliged by the compliment paid him in his re-election. He was personally largely interested in the company, as also were several members of his family, and had been so from its formation, and he could assure the meeting that his best attention would continue to be given to the administration of its affairs. With reference to the purchase of the freehold land at Rouen he believed few gentlemen in the room were aware of the vital importance it was to the company; and he had confidence in stating that, being conversant with business of this description, he believed the directors had done the most prudent thing they could do, and one which would conduce more to the welfare of the undertaking than anything which had been done since his connexion with the company.

Mr. HARRISON returned thanks for himself and brother auditor, Mr. Lewis. He said it was always a great pleasure to them to fulfil the duties of their office for two reasons—first, that they always found the accounts in most excellent order; and, secondly, that the results of their examination were always entirely satisfactory.

On the motion of Mr. STOKES, seconded by Mr. ROAN, a cordial vote of thanks was presented to the chairman and directors for their admirable management of the affairs of the company.

The CHAIRMAN: Gentlemen, we return you our grateful acknowledgments, as we have done at these meetings for many years past, for your kind recognition of our services. I may say, unhesitatingly, that we have had a great deal of anxiety and trouble during the past year, but our labours have been greatly alleviated by the assistance of our worthy secretary. We have done the best we could to maintain your interests, and we shall continue to do so; and we hope when we meet you here again next year you will feel justified in again thanking us for our attention to your affairs.

Mr. HUGGINS: Before the meeting separates I shall ask the shareholders to join in a vote of thanks to the secretary. We have heard from the chair that during the two years of the troubles incidental to the war in France, and amidst the anxieties, responsibilities, and I may add the dangers attaching to his office, our secretary so commended himself by his services as to merit the special recognition referred to. I am sure we all desire to endorse the act of the directors in that respect, and shall give him on this occasion a hearty vote of thanks.

Mr. J. CROWDEN: I shall be most happy to second the motion.

The CHAIRMAN: Allow me to say, as chairman of the directors, that we most thoroughly go with you in everything that can be said in praise of our secretary.

Mr. BADDELEY suggested that the motion should take the form of presenting the best thanks of the meeting to Mr. Backler, as secretary and general manager, and heartily confirm the resolution of the directors conveyed in the chairman's statement that day.

The suggestion was adopted, and the motion put and carried unanimously.

The SECRETARY: Gentlemen, I feel exceedingly gratified for the very kind way in which this question has been put before you, as also for the cordial manner in which it has been received. I may say, that in the management of this company, that which constitutes my strength is the perfect confidence which exists between the directors and myself. The board know that I am heartily devoted to the promotion of the prosperity of the undertaking, and I feel they know it. On the other hand, I have a most able and efficient staff to assist me in carrying on the affairs of the company, and, with these combined advantages, if we were not successful it certainly would be our own fault in ordinary times. It is true that, during the last two years, we have gone through very great troubles, but I think we are not entitled to much praise for our efforts in such a crisis. The time of difficulty is the time when we should put our shoulders to the wheel and pull the old coach out of the rut. We have done our best, and we have been fortunate in securing success. I think it is not likely we shall ever have such times again, but should they occur, you may be certain I shall, as before, devote all my energy and abilities, such as they are, to carry the company through any difficulties which may arise. I thank you most heartily for this resolution, and especially for the very handsome and delicate way in which the satisfaction of the company has been signified to me.

The proceedings then terminated.

WATER-RATES IN THE CITY OF LONDON.—At the meeting of the Court of Common Council on the 18th inst., the Gas Committee brought up a report, stating that they had referred the question as to the notice of the New River Company to levy a rate of £4 per cent. upon the rateable value of property within the City of London to the Remembrancer and the City solicitor, who stated that "the 35th section of the New River Company's Act of 1852 authorizes the company to charge for the supply of water to any dwelling-house, where the annual value shall not exceed £200, £4 per cent. per annum on such value, and, where the annual value exceeds £200, £8 per cent. per annum. There are extra charges for baths and water-closets and high services, which means a delivery at 10 feet above the ground floor. There are special provisions about water required for other than domestic purposes, and for the use of meters, the whole of which are easily ascertained by reference to the Act itself." The report was adopted.

GAS PURIFICATION AT BECKTON AND BOW.

RETURN to an Order of the House of Lords, dated the 4th of July, 1872, for Copies of further Reports by the Gas Referees on the Sulphur Purification at the Beckton and Bow Gas-Works, dated the 3rd of June and the 17th of June, and the Observations thereon by The Gaslight and Coke Company, dated the 25th of June, 1872 (in continuation of Parliamentary Paper No. 174).

Board of Trade, Gas Referees Department,
21, John Street, Adelphi, London, W.C., June 3, 1872.

Sir,—The gas referees have much pleasure in informing you of the results of the sulphur purification at Bow and Beckton, since the report of the referees was placed in the hands of the gas engineers of those works.

In that report (p. 15) they stated that "lime in the form of sulphide of calcium (*i.e.*, saturated with sulphuretted hydrogen) *is a perfectly adequate purifying agent for 'sulphur.'*" In proof of this they informed the Board of Trade that in their laboratory experiments they are able in this way to entirely remove the "sulphur from the gas," and they expressed their confident assurance that, after making all allowance for the difference between laboratory experiments and purification on a manufacturing scale, the results obtainable from the lime process of purification "*will be adequate to the requirements of the public* if the carbonic acid which enters the purifiers be kept down to the lowest point attainable in gas-works." They then showed how this was to be done, and described their new method of working lime purifiers, in terms perfectly explicit, and such as they have no occasion to alter in a single word (*vide* report, pp. 15--17).

In your letter of April 23, it is said, "judging from the recent report on the sulphur purification at Beckton, it does not appear that any great advance has been made in solving the difficulties" connected with the sulphur question, "or that any early solution of these difficulties is to be expected from the referees."

In their reply (April 30), the referees felt bound to state that they "must beg respectfully to differ entirely from your views as to the present state of the sulphur purification question. So far from considering that no further improvement is soon to be looked for, they are perfectly confident that never before was a great advance in this important branch of gas manufacture so near at hand . . . The referees believe that before next Christmas the sulphur maximum in all gas-works where lime can be used may be reduced by one-third of its present amount," and they confidently expect that a still lower point will subsequently be attainable without any injustice to the gas companies."

You will observe that the gas referees expressed these opinions with perfect confidence, as they were justified in doing from the facts and explanatory statements given in their report; and they have now much pleasure in forwarding to you statistics of the official testings made since the issuing of that report. The only gas-works under the supervision of the referees where lime can be freely used are those of the Chartered Company at Bow and Beckton, and the following statistics show the state of the sulphur purification at those works during the six months prior to the referees report being placed in the hands of the engineers of the Chartered and other companies:—†

SULPHUR AT BOW.

1871.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	
Maximum	73·3	32·9	28·5	35·1	30·8	36·7	Average for six months 24·5 grains.
Average	35·6	19·4	24·2	22·9	22·2	22·8	

SULPHUR AT BECKTON.

Maximum	50·5	52·8	49·9	53·2	51·2	53·6	Average for the six months 41·8 grains.
Average	39·2	41·6	41·6	45·2	44·4	38·7	

During the two months that have since elapsed, the official testings show as follows:—

SULPHUR AT BOW.

	April.	May.
Maximum . . .	20·2	14·3
Average . . .	12·5	9·5

SULPHUR AT BECKTON.

	April.	May.
Maximum . . .	48·8	45·1
Average . . .	33·2	27·7

These statistics show an improvement of upwards of 100 per cent. in the average purity of the gas supplied from Bow, as well as a great diminution in the fluctuations in the amount of sulphur. At Beckton the improvement already attained averages over 20 per cent., and the referees feel assured that, if their lime process of purification be properly carried out, the sulphur at Beckton may easily be brought down to as low a point as that now attained at Bow.—I am, &c.,
(Signed) T. FOSTER, Secretary.
T. H. Farrer, Esq., Secretary, Board of Trade.

Board of Trade, Gas Referees Department,
21, John Street, Adelphi, London, W.C., June 17, 1872.

Sir,—The gas referees have much pleasure in informing you further of the result of the sulphur purification at Bow and Beckton since the report of the referees was placed in the hands of the gas engineers of those works.

The following are the official returns for the first fortnight of June:—

Beckton.	Bow.
11·9	3·5
11·8	3·3
12·6	3·8
14·7	3·8
16·4	5·0
14·0	5·0
15·3	4·7
12·3	3·3
11·6	3·9
19·3	5·3
17·0	4·4
Maximum . . . . . 19·3	Maximum . . . . . 5·3
Minimum . . . . . 11·6	Minimum . . . . . 3·3
Average . . . . . 14·2	Average . . . . . 4·6

* Or rather (as there is no sulphur maximum at present) of the amount at which the referees have given notice to the gas companies of their intention to fix it on the 1st of October next.

† The issuing of the report was delayed until the last week of March, as it was thought advisable to accompany it with a report which the referees had requested the Chartered Company to furnish of the means adopted and of the professional advice obtained by the company in connexion with the purification at Beckton, a report which was promised but has not yet been received.

As shown in the referees letter dated the 3rd of June, the improvement commenced the beginning of April, and now, in the first fortnight in June, amounts to 500 per cent. at Bow, and with the almost total absence of the fluctuations which were so characteristic of lime purification, and which so clearly indicated the ignorance which prevailed as to the right mode of using that material in gas purification. At Beckton the improvement has equalled 300 per cent., and the referees feel perfectly confident that if the directions given in their report are properly carried out, the sulphur at Beckton will easily be reduced to as low a point as that now attained at Bow; in fact, as already stated, the referees process of using lime is capable of "entirely removing the sulphur in gas," and thereby attains the great object which gas engineers and chemists have hitherto sought after in vain.—I am, &c.,
(Signed) T. FOSTER, Secretary.
T. H. Farrer, Esq., Secretary, Board of Trade.

The Gaslight and Coke Company (commonly called the Chartered Gas Company), Horseferry Road, Westminster, S. W.,
June 25, 1872.

Sir,—Your letter of the 17th inst., with copy of that dated the 3rd inst. from the gas referees, enclosed in it, has been laid before the directors, and I am instructed to forward to you the accompanying copies of reports which have been made to them on the subject by the superintendents of their Beckton and Bow stations.—I am, &c.,
(Signed) J. O. PHILLIPS, Secretary.
W. R. Malcolm, Esq, Board of Trade.

Gas-Works, Beckton, June 25, 1872.

Dear Sir,—At your request I beg to make the following remarks on the letter of the gas referees to the Board of Trade, dated the 3rd of June.

I will first state that we are now realizing what I told the referees some months since—viz., that when our purifying arrangements were completed according to the original design, that we should be enabled to reduce the amount of sulphur considerably.

In comparing the results attained here and at the Bow works, I may remark that the referees have overlooked the fact that with the kind of coal in use here we have as much sometimes as 70 grains of sulphur to deal with in our crude gas, while at Bow, with a different coal, the maximum is about 40 grains, so that it appears to me that it is necessary to determine in what state it exists in the gas, and how much of it can be extracted by sulphide of calcium before a maximum quantity can fairly be fixed. Some of our eminent chemists who have deeply studied the question have not been able, as yet, to come to a conclusion in the matter.

I may add that I have endeavoured in laboratory experiments to reduce the amount of sulphur by a more extended system of purification by sulphide of calcium, but hitherto without any great results.

The main point of the referees letter, and one personal to myself, is the credit taken by them for an improved method of using the lime purifiers at these works, which they call their lime process, and that it is in consequence of their report being placed in my hands that we have been enabled to reduce the amount of sulphur.

Without the slightest communication with any one, I, on the 24th of October, last year, adopted the process, the beneficial results of which were communicated by me to the referees, and appear in the statistics published by them. I was obliged to defer the further use of the process until the recent completion of our check purifiers. It is now in successful operation, and fully realizes the good results which I led the referees to expect from it.

In conclusion, I feel bound to say that I have devoted myself for months past to the elucidation of the question. I have never received any suggestions or information from the referees, but, on the contrary, I have taken especial pains to place before them, as clearly as possible, all the information and details of experiments which are contained in their report, as far as Beckton is concerned, as well as the facts to be deduced therefrom. The source of this information is not acknowledged in the report of the gas referees.—I remain, &c.,
(Signed) G. C. TREWBY.
J. O. Phillips, Esq.

The Gaslight and Coke Company's Works, Bow Common, June 20, 1872.
(Observations on the Letter of the Gas Referees to the Board of Trade, dated June 3, 1872.)

1. As to sulphide of calcium being a "perfectly adequate purifying agent for "sulphur," the knowledge of this and of its applicability on a manufacturing scale were doubtless obtained by the gas referees from their observation of the working at these works, where lime has been practically used for the sole purpose of removing the sulphur compounds during the last five and a half years in the same manner as it is at present, and with results freely communicated to the gas referees.

2. As to the effect of carbonic acid on the lime, it was known to me from the very first that carbonic acid nullified the effect of lime on the sulphur compounds, and this action, with the experiments proving it, was among the first statements presented by me to the gas referees on the commencement of their inquiries.

3. As to "their new method of working lime purifiers," I am now working the same purifiers in the same manner as I have done (with experimental exceptions) ever since their erection in 1867. The full details of this working have been asked for by the gas referees, and furnished by me to them from time to time.

4. As to the diminution of the sulphur compounds during the past three months in the gas supplied from this station, I attribute this principally to a change in my method of slaking the lime, which is now done with as little water as possible, and to some extent possibly to the temperature of the gas as affected by the atmospheric temperature.

5. The assumption by the gas referees of the use of lime being "their lime process of purification" is entirely unwarrantable, as I again repeat that I used lime at this station essentially as at present in January, 1867, one and a half years before the passing of the Act which created the office of the gas referees, and that any improvements that have been made since in the manipulation have been the result of observations made during the working, without benefit of suggestions made at any time by the gas referees.
(Signed) ROBERT HARRIS.

AMALGAMATION OF THE WESTERN GAS COMPANY AND THE GASLIGHT AND COKE COMPANY.—At the meeting of the Metropolitan Board of Works, on Friday last, the Works and General Purposes Committee reported as follows:—"Your committee have further to report that they have considered the letter from the Board of Trade, transmitting the draft scheme for the amalgamation of the Western Gas Company with the Gaslight and Coke Company, the same having been referred to them on the 28th ult. In the year 1871 an Act was passed providing for the amalgamation of the Equitable Gas Company with the Gaslight and Coke Company, and by the same Act power was given to the latter company to amalgamate with their own any other gas undertakings within the metropolis, subject to the sanction of the Board of Trade. It is under the power so given that the present scheme of amalgamation is proposed. Your committee have looked through the clauses of the scheme, and they see nothing therein which is inconsistent with the City of London Gas Act, 1868, or the Act of 1871, or to which reasonable objection could be taken. They recommend that the Board of Trade be informed that this board have no objection to offer to the scheme." The report was agreed to.

HUDDERSFIELD CORPORATION GAS-WORKS.

INCREASE IN THE PRICE OF GAS.

The Ordinary Meeting of the Town Council was held on Tuesday, July 16—Alderman CROWTHER, in the absence of the mayor, presiding.

The minutes of the Gas Committee were read, from which it appeared that the committee met on the 9th inst. The question of advancing the price of gas was discussed in consequence of the manager having reported that the advance in the price of coal alone was equivalent to an increase of 4d. per 1000 feet, and that, in addition, a rise of nearly 50 per cent. had taken place in the price of mains, and that a heavy advance had been experienced in the price of meters, stores, and materials of every description, as well as wages. At the conclusion it was recommended to advance the price of gas 4d. per 1000 feet, commencing with the current half year.

Councillor H. HIRST now moved that the recommendation of the Gas Committee, increasing the price of gas from 3s. to 3s. 4d. per 1000, be referred back to the Gas Committee. He did not think the proposed advance was reasonable. It was said, when the gas-works became the property of the town, that the object of the ratepayers would be to keep up the price of gas for the purpose of reducing the rates. Although not a large ratepayer, but a large gas consumer, he saw no force in that objection, for he believed the gas consumers were able to take care of themselves. In looking over the gas accounts he found that 195 million feet of gas were made last year from 20,400 tons of coal. Taking the average advance at 3s., it made an advance, in round numbers, of £3250. That left a balance, if they advanced the price 4d. per 1000, of £250. They had already risen the price of coal 1d. per cwt., which would bring in £1600 to £1700 extra. Besides that, there was a surplus of profit, up to last Christmas, of about £2000 a year. He spoke on the authority of Mr. Jere Kaye when he said that if the council had not bought the gas-works, the old company would have raised the price of gas last Christmas. He thought it wrong to advance the price of gas 4d. per 1000 feet, considering that last Christmas the borough had £2000 over its expenditure.

On the suggestion of Councillor ASTON, Mr. HIRST substituted for his amendment a motion that the price of gas be raised 2d. instead of 4d. per 1000 feet.

Councillor J. HIRST seconded the amendment.

Councillor MARRIOTT thought the way to look at the matter was to consider what they would have to pay if the price of coal continued to rise in the way it had lately risen. Coals had risen 3s. per ton, and they were proposing to advance the gas 4d. per 1000 feet, and a penny yielded £800; that was only £3200. If they took that into consideration, and likewise the extra cost of all the mains they would have to lay, the extra cost of labour, in fact the extra cost they gave for everything, the increase in the price of gas would hardly pay for it. There was another thing they ought to consider. Every penny lost on the gas-works would have to be paid out of the borough fund, and people would have to pay for them that had neither gas nor street lamps. He considered gas consumers should not be placed in a worse position than when they were under a private company. Under any circumstances, the Corporation could not carry them on at a loss, and they ought to fix the price so as to leave about the same margin as they had when they purchased them.

Councillor WALKER thought the action of the Gas Committee premature. They ought not to have recommended an increase in the price of gas until they had ascertained the facts of the case. If the action of the committee had been taken in order to keep the council in good faith with the town, he thought it was a great mistake—something like taking money out of one pocket and putting it into another.

Councillor HOUGHTON quite agreed with the opinion of Councillor Marriott, that it would be very wrong on the part of the corporation to attempt to make a profit on the gas. They could not do that without inflicting an injustice upon the ratepapers, or else on the gas consumers, for the gas consumers would be paying more in order to reduce the rates. On the other hand, if the gas consumers paid a little more for their gas, they reaped this advantage, that whatever the surplus might be it went in liquidation of the rates, and they were thus relieved nearly in proportion to the amount of gas they consumed. If the gas-works came to be charged upon the borough fund, they would see they were charging people for gas who had neither part nor lot in the matter. He thought that would be a gross injustice. Under the circumstances the proper policy to follow was this: to take care their profits were as small as they could possibly make them, but, to be secure, to keep on the right side of the balance-sheet. Mr. Burgess' statement upon the question, which he believed to be correct, was simply this: an advance of 3s. per ton in the price of coal is equivalent to 4d. per 1000 feet in gas. If that was the only expenditure that was increased since the works fell into the hands of the corporation, they would have good grounds for finding fault and saying, "You have gone to the extreme of the question." But was that so? Allow him to tell them it was not. About two months before the works fell into the hands of the corporation, the majority of the people working at the gas-works were advanced; and if they considered all the advance that would come out of the next balance-sheet that was not upon the last, they would find that they had, with the price of pipes and other things, an advance of something like £700. He was warranted, from the statement of Mr. Burgess, in saying that the cost of making gas would be £4000 more than it was last year. He was certain that if they only rose the gas 2d. per 1000 the next balance-sheet would be on the wrong side, and Mr. Burgess was of the same opinion. It had been urged that it was too early to raise the price of gas, but they must either do it now or wait till next year, for if they did not soon give the consumers notice they would have to defer it till the close of the present half year.

Councillor R. HIRST did not think the proposed advance was unreasonable The mill-owners in the district had raised their rents 25 per cent., and 12 per cent. rise for gas was not too heavy.

Councillor D. EASTWOOD said Councillor Houghton had made it plain to him they ought not to raise the price of gas at all. It appeared the whole of the extra cost would be £4000 per annum. Councillor Houghton admitted they had £1800. Then there was £700 a year they would get extra for their coke. He thought they would be £500 better on the gas-works than they were last year according to Councillor Houghton's own showing.

Councillor HOUGHTON said, to set against the higher price of coke, the price of lime had risen from 10s. to 11s. per ton.

The CHAIRMAN thought they would all agree that the consumers would have to pay for the gas whatever it made; and he believed if they could only see the balance sheet before them they would be all agreed on the subject.

The amendment for a rise of 2d. instead of 4d. in the price of gas was then put to the council and carried, five only dissenting.

EAST BARNET GAS COMPANY.—At a special general meeting of the shareholders of the East Barnet Gas and Water Company, held on Monday, July 22, under the presidency of Mr. Robert Wilkinson, a resolution was unanimously passed, approving of a bill, intituled "The Barnet District Gas and Water Act of 1872," for amalgamating this company with the Potter's Bar Gas and Coke Company, Limited, and the Barnet Consumers Gas Company, Limited, and for other purposes. The opinion was generally expressed at the meeting that such an amalgamation will ultimately prove highly favourable to all concerned in the three companies.

THE CORPORATION OF RYDE AND THE GAS-WORKS PURCHASE ARBITRATION.

A Special Meeting of the Council of this Borough was held on Wednesday, July 17, "for the consideration of the report of the Gas sub-Committee in reference to the Provisional Order and Mr. Stevenson's claim, and to take such steps as may be then determined thereon." The ex-Mayor (Alderman Thurlow) presided.

Mr. White brought up the report of the committee. It stated (*inter alia*) that on Wednesday they attended with the mayor and town-clerk as a deputation to the Local Government Board with respect to the provisional order for repealing portions of the local Act, and for borrowing money for the purchase of the gas-works, when the president of the local board informed them that an order would be made, and, if unopposed, confirmed, during the present session of Parliament. The committee also laid before the board a copy of Mr. Stevenson's particulars of demand, as follows:—Himself, 46½ days, at ten guineas a day, £488 10s.; accountant, 64¾ days, at one guinea a day, £67 19s. 9d.; clerks, 23½ days, at 10s. 6d. a day, £12 4s. 3d.; travelling and hotel expenses, £63 1s. 3d.; postages, telegrams, and stationery, £3 1s.; paid law stationer and lithographer, £22 8s.; total, £657 4s. 3d. As Mr. Stevenson had been paid £100, there was a balance due to him of £557 4s. 3d., and as the committee considered the charges exorbitant, they recommended that a sum of £412 1s. 9d. should be paid into court.

The following communication was read by the clerk:—

Local Government Board, Whitehall, July 16, 1872.
Provisional Order.

Sir,—I am directed by the Local Government Board to transmit to you a draft of the provisional order which they have prepared to enable the Local Board of Ryde to purchase the gas-works for your perusal and immediate return.

The board had proposed to introduce it into the bill which was presented to the House of Commons last night to confirm other orders which they have issued, but they find from communications which they have received that a petition is likely to be presented against the bill as affecting the borough of Ryde. If this were to take place, the whole bill would be delayed, and at this late period of the session would probably be lost. The board have therefore deemed it inexpedient to introduce it into that bill. If, therefore, they proceed to execute the order there must be a separate bill to confirm it, and should a petition be presented in opposition, there would be no means of passing the bill, as it could have no chance of being read in the House of Lords a second time, supposing that it should pass through the House of Commons.—I am, sir, your obedient servant,

W. H. Pullen, Esq., Town-Clerk, Ryde. W. G. LUMLEY, Assistant Secretary.

A letter was also read from from Mr. W. S. Arnold, Honorary Secretary of the Ratepayers Association, informing the council that the association had resolved to oppose in Parliament the confirmation of the provisional order, and that they had instructed Messrs. Dorrington and Co. to act on their behalf as parliamentary agents.

Mr. WHITE explained the various portions of the report, and said the third part of the report he could not speak upon without regret, as he had been instrumental in getting Mr. Stevenson appointed.

Mr. T. DASHWOOD proposed the adoption of that portion of the report affecting the board and Mr. Stevenson. He had written to Mr. Stevenson to know if the matter could not be arranged, and had received a telegram to the effect that Mr. Stevenson could not accept the proposal, as he contended that his charges in this case were less than those made by other professional gentlemen. The committee had been advised that the charges were exorbitant, and he presumed Mr. Stevenson was also acting under advice, so that it was possible he may be of opinion that he could sustain this claim in law. The committee believed £412 would meet the justice of the case; and he, therefore, moved that that sum be paid into court. They had acted under the advice of Mr. Fardell, their solicitor, and that gentleman's London agent.

Mr. WHITE seconded the resolution, upon the ground that Mr. Stevenson's claim was exorbitant. He himself had never admitted the claim in committee, but had, from the very outset, disputed it. A proposal had been made to submit the matter to arbitration, but the telegram received was proof positive that to this proposition Mr. Stevenson said "No." Mr. White therefore, hoped the board would consent to pay in £412 1s. 9d. and then fight it out. Their duty was to stand firm and see that the public money was not thrown away. He never expected Mr. Stevenson would have acted in the way he had. He (Mr. White) did not stand at that board as a professional man, but as one of its representatives, to see justice done to the town. He would like to see Mr. Stevenson paid; at the same time he would be the first to resist an unfair demand, rather than pay that which he considered unfair, he would sooner see their goods and chattels seized. He believed Mr. Stevenson would take the amount offered rather than go into court and expose himself.

The CHAIRMAN observed that, at any rate, paying that money into court would stop present proceedings.

Mr. FARDELL explained that he had received a letter from his agents, who had in vain tried to obtain an extension of time. The time had, in fact, expired on Monday last. As they could not succeed in getting an extension of time, it was absolutely necessary to pay the money into court; then, if Mr. Stevenson went to a trial, and did not obtain a verdict for more than they had paid in, he would have to pay all the costs.

Mr. T. DASHWOOD explained the mode in which the committee had arrived at the sum to pay into court; but as its justification, in the event of a trial, might be injurious to the town, refrained from giving these statements publicity.

Mr. KNIGHT advised the council to be careful what they were doing. He did not for one moment believe that the arbitration expenses could be recovered. He had been requested to give them warning, for if they voted this money they would most assuredly have to repay it. For his own part he should leave the council chamber when they took this vote. The very idea of the council entering into what may probably be an expensive lawsuit, after paying a man within £145 of the demand, was ridiculous in the extreme. They had brought the town into a mess, and they knew it. As to the provisional order, they had not the ghost of a chance of getting it, and they knew that also. Did they think the taxpayers would stand it? He (Mr. Knight) knew they would not. The troubles of the council were coming thicker and faster, and they had brought it on themselves.

Mr. C. COLENUTT, although a member of the committee, objected to the report, and would not therefore support it. He would like Alderman Dashwood to have gone into the whole matter. For his own part he would not vote for going to law, and was sorry to see the council were about to adopt that course.

Mr. MARVIN warmly supported the proposal, and expressed a hope that every member present who wished well to the town would do the same. They had exhausted every means of arrangement with Mr. Stevenson.

Mr. BEVINS did not feel comfortable on the question of personal liability. The town-clerk on the previous night had advised that they were not personally liable; subsequently Mr. C. Colenutt had intimated to him that they were liable, so that it raised doubts in the mind which in these days of threatening should be cleared up. He would like to know whether Mr. Thomas Dashwood, Mr. White, Mr. Marvin, and other gentlemen, would sign the cheque. If these gentlemen were not disposed to do so, why should he (Mr. Bevins) risk his family's property? He certainly would decline to do so unless others set the example.

Mr. SIPLEY said as their solicitor was present, perhaps he would advise them on the subject.

Mr. KNIGHT said that advice would be worth nothing, inasmuch as Mr.

Fardell was an interested party. Of course the learned gentleman would have a large bill himself. He gave them warning that it was not legal; Mr. Pullen's opinion could not set aside the Act of Parliament.

Mr. FARDELL said the corporation having agreed to purchase the gas-works, anything they did in connexion therewith was legal.

The CHAIRMAN considered it would be far better to take the safe side, and settle the whole matter at once. If it was his own private matter he should adopt that course, and what he would do for himself he would do for the town. He would, however, support the vote, leaving the responsibility with the committee.

Mr. J. COLENUTT said he was in a perfect fog. He could not see how they could carry things out without money, and they were constantly told that what they were doing was not lawful, so that he could not make up his mind to vote for the resolution.

Mr. OSBORNE also felt doubts, and should decline to vote at all.

Alderman T. DASHWOOD said that as Mr. Councillor Bevins had stated things had been kept back, he should like to know what they were.

Mr. BEVINS replied that it was only from hearsay that he made that statement.

Alderman T. DASHWOOD knew of nothing that had been kept back that the ratepayers ought to know. It was not the first time that threats had been hurled at them. However, they would survive that. He had a conflict in his own mind whether it was not the most economical plan to settle Mr. Stevenson's claim at once. Even supposing this was not a legal charge, he still felt they were called upon to pay the debt. They were bound to pay, and it must therefore be paid. Mr. Stevenson was appointed under a seal of the board, and therefore they were bound to pay him; and all who were present when Mr. Stevenson's appointment was made must take their full share of the responsibility. They ought not to shut their eyes to the fact that there were rocks ahead. Considerable amounts would soon have to be paid, and this could easily be traced to the doings of the Ratepayers Association. He had been blamed for writing to Mr. Stevenson, but his object was to come to an arrangement in order to prevent litigation. As to saying that he had refused to sign cheques, he had once done so, but it was done jocularly. He was quite ready to sign the cheque now required, if authorized by the vote of the board.

Mr. WHITE also expressed his willingness to sign the cheque.

The question was then put, and there appeared—for the proposition, 6; against it, 2; neutral, 3.

A cheque for £412 1s. 9d., to be paid into court on Mr. Stevenson's account, was then signed by Alderman Thomas Dashwood and Councillors White and Marvin.

Mr. WHITE then read the provisional order, the text of which is as follows:—

Whereas an Act of Parliament, being a local Act, was passed in the 18th year of the reign of her present Majesty, intituled "An Act for regulating and improving the town of Ryde, in the Isle of Wight, and for providing a supply of gas and water thereto, and for other purposes."

And whereas the boundaries of the said town were set out in a schedule to the said Act, and whereas the commissioners, acting in execution of the said Act, on the 17th day of October, 1859, adopted the Local Government Act, 1858, and whereas by letters patent, bearing date the 23rd day of July, in the 32nd year of the reign of Her Majesty, the inhabitants of the said town of Ryde, as described in the said local Act, were incorporated by the name of the mayor, aldermen, and burgesses of the borough of Ryde, in the Isle of Wight, and a mayor, aldermen, and burgesses were thereupon and henceforth have been duly chosen and elected for the said borough.

And whereas the commissioners, acting under the said Ryde Improvement Act, by deed under their common seal, bearing date the 15th day of December, 1868, transferred unto the mayor, aldermen, and burgesses of the said borough, all the rights, powers, estates, property, and liabilities vested in, or appertaining to, them under the Ryde Improvement Act, 1854, or under or by virtue of any other Act or Acts of Parliament or otherwise howsoever, and the said mayor, aldermen, and burgesses are now acting as the local board for the said borough.

And whereas power is given by the 85th clause of the said Ryde Improvement Act to the commissioners therein to purchase by agreement from the Ryde Gas Company all the land, buildings, gasometers, retorts, mains, and pipes of the said company.

And whereas the said Act specifies various purposes for which the said commissioners were specially authorized to borrow money at interest, but the purpose of purchasing the gas-works of the said company is not one of them.

And whereas it is provided in clause 125 of the said Act as follow:—

"It shall be lawful for the commissioners when and as they shall think fit so to do, to borrow at interest on mortgage upon such terms as they shall think proper, any sum or sums of money not exceeding in the whole the sum of fifteen thousand pounds, for or towards all or any of the purposes of this Act other than those for which money is herein before specially authorized to be borrowed, but so nevertheless that inclusive of the existing debt of £4731 10s., there shall not be owing on the securities by this section authorized any more than the sum of £15,000 in the whole at any one time."

And whereas the said mayor, aldermen, and burgesses, as such local board, are desirous of purchasing the gas-works of the said company, and have entered into negotiations accordingly, but the value of the same as ascertained in the manner prescribed by the Act will exceed the said sum of £15,000.

And whereas the said commissioners were empowered by the 117th clause of the said Act to make assessments for all the purpose of that Act not therein otherwise expressly provided for, but it was enacted that such assessments should not exceed in one year 2s. 6d. in the pound, including the town-hall rate therein mentioned, which limit of assessment would prevent the said mayor, aldermen, and burgesses from carrying their purpose into effect.

And whereas it has appeared to such mayor, alderman, and burgesses, as such local board, to be desirable that the said local Act should in many parts be repealed, and in others altered, and they accordingly have presented a petition to the Local Government Board praying for the repeal of many parts of the said Act and the alteration of others.

And whereas the Local Government Board directed an inquiry to be made in respect of the matters mentioned in the said petition, and such inquiry has been duly held, and a report thereon presented to the board.

Now, therefore, we, the said Local Government Board, acting under the authority of the said several statutes in that behalf, considering that a part of the matters contained in the said petition require to be sanctioned, and that parts of the said Act referred to should now be altered, do hereby order as follows:—

"Instead of the amount of £15,000 set forth in the 125th clause of the said local Act, as the limit of the sum to be borrowed for the purposes therein referred to, the local board may borrow at interest, on mortgage of the rates authorized to be raised under that Act, any sum or sums of money not exceeding, with all other moneys now borrowed, and charged upon such rate, two years assessable value of the premises assessable thereto within the said borough, but so that the amount borrowed shall be repaid within the period of 50 years from the borrowing of the same."

And we do further order that so much of clause 117 *as imposes a limit upon the amount in the pound for which the said rate therein mentioned can be made, and that clause* 126 *be repealed.*

Mr. WHITE said that to him it was a matter of deep regret that their labours had, at any rate up to that time, been thrown away. Of course, if a petition was presented against the bill, it would be useless for the council to throw away a lot of money. They had done their utmost to avert difficulties from the commencement, but he, for one, felt they had done their duty to the town. There had been great delay with the Local Government Board; in fact, in his opinion, that board had not treated them well. The president said the ratepayers of Ryde had sent communications, but he wondered that the board listened to the ratepayers. It was now for the town to say whether these negotiations must fall through. He thought, as regarded the provisional order, the clerk had better look it through and return it to the board in London—a board that required reform, and he hoped some member of the House of Commons would speedily direct his attention to the subject.

Alderman T. DASHWOOD observed that it would be impossible for a provisional order to be obtained this session, and it would be utterly impossible for the town to have gas-works of its own. He for one never felt in favour of the purchase, but fell into it out of deference to public opinion, for, undoubtedly, public feeling was formerly in favour of the purchase. Having been one of those who voted for giving the notice to purchase, he had gone on with it up to that time. He contended that it was only the price which had changed the current of public opinion. That was no reason why they should repudiate it, for, in his opinion, they were bound to complete it, whether the price was £15,000 or £50,000. If the council did not complete, there would be a monopoly for ever; indeed, the town would very shortly have to pay more for the public lamps.

Mr. BEVINS was under the impression that the company could go to Parliament for an extension of powers.

The CHAIRMAN was of opinion that they had better refer the order to a committee to report upon. One thing was quite certain—there was no chance of its being carried out this year.

Mr. KNIGHT thought they ought to have some information from the deputation who had gone at the expense of the town; they ought to have brought up a report of their doings. It was rumoured that the clerk had had a good jacketing.

The CHAIRMAN thought Mr. Knight would not exactly like to hear all that had been said about him.

Mr. KNIGHT insisted that misstatements had been sent up with the intention of misleading the Local Government Board. The association had made up their minds, and had instructed their parliamentary agent to oppose the order. The corporation had better, therefore, have the grace to withdraw rather than be defeated, which would most certainly be the case. Did the board think that the ratepayers would submit to the repeal of the 2s. 6d. clause by which they would be enabled to make rates to any amount? He could tell them they would not.

Mr. C. COLENUTT characterized the order as a sham, and moved that it be not accepted, when a lengthened discussion ensued, in which nearly all the members of the board took part.

Ultimately the document was ordered to be returned with certain alterations suggested.—*Ryd News.*

RYDE RATEPAYERS ASSOCIATION.—A special meeting of this association was held on Monday evening, July 15, at the Anglesea Tavern, when there was a large attendance of members, presided over by Captain Gordon Watson. A report was read from the deputation appointed to confer with Gas Sub-Committee about the purchase of the gas-works. This report was unanimously adopted. Mr. Gabell moved, and Mr. Gibson seconded, the following resolution, which was also unanimously adopted:—"That in the event of a provisional order being issued proposing to give powers to complete the purchase of the gas-works, or to repeal any of the clauses in the Ryde Improvement Acts against which we have contended, the meeting hereby authorizes its committee to take the necessary steps for opposing the order in Parliament, and to take any other measures that may be advised against certain members of the Town Council for various breaches of trust, by filing a bill in Chancery or otherwise." The meeting also authorized the committee to issue a circular to the inhabitants, and to appoint collectors to receive subscriptions to defray the necessary expenses incurred in carrying out any measures to protect the interests of the ratepayers.—*Ryde News.*

MAJOR BOLTON'S REPORT ON THE METROPOLITAN WATERS FOR THE MONTH ENDING JULY 15.

The state of the river at Hampton, where the intake of the West Middlesex, Grand Junction, and Southwark and Vauxhall Companies is situated, has been generally good during the period embraced in this return. The highest state of the river was 1′ 1″ above the 4-feet culvert of the West Middlesex Company (or summer level), and the lowest 0″. At Ditton, where the Chelsea and Lambeth Companies draw their supplies, the river was indifferent from the 16th to the 23rd of June, when it improved, and remained good to the 28th of June; it then became indifferent, and remained so until the 8th of July, when it cleared, and has since been good. The highest state of the water at this place was 2′ 5″, and the lowest 2″ above the (6 foot) summer level. The highest temperature of the water at Ditton during the month was 72°, and the lowest 64°, while the highest temperature of the air at the same place was 87°, and the lowest 60°. These observations are uniformly made daily at 9 a.m. The rainfall at Ditton during June was 2·5 inches. The vegetable growth in the filter-beds of the Thames and East London Companies has been considerable during the past month, causing the filters generally to become quickly choked, especially those of the Southwark and Vauxhall Company, which were so clogged up as to cause the company to deliver a short supply for a few days to a part of their district (Bermondsey and Rotherhithe).

THE ACCIDENT AT THE NEEPSEND WORKS OF THE SHEFFIELD GAS COMPANY.—Another of the victims to the accident at Neepsend Gas-Works has died—George Connor—a youth 16 years of age. An inquest was held on the 19th inst., when a verdict of "Accidental death" was returned.

SUPPLY OF GAS TO ARBROATH.—At the meeting of the Town Council, on the 11th inst., the Provost submitted the annual balance-sheet, showing that the income had been £7675 5s. 11d., and the expenditure £6672 12s. 6d., and that there was thus a net profit for the year of £1002 13s. 5d. This was a most satisfactory statement. They could scarcely make a comparison with last year, because the last balance-sheet embraced only eleven months. The revenue, he was glad to say, had increased £714 10s. 4d. On the expenditure side the material had cost £486 13s. 5d. more than last year; and the Provost at some length explained how the various differences arose, dwelling particularly on the advance on the price of coals. The consumers had fallen off in number—a number of meters having been taken out of houses as not having been used. With regard to the future, he was glad to say that they had secured a fair supply of coals for next year at a moderate rate—certainly not so many as they would require if the consumption went on increasing. They were, however, well provided, and as there was no appearance of coals being cheaper, they must just pay the market price when they came to require them. They would not, however, require to do this for some considerable time, and when a reaction took place in the coal market they would get coals, if not so cheap as formerly, at a moderate price. New coal-sheds were being erected, so that should any great extension of the consumption take place they would be prepared for it by next year. It was satisfactory that they had such a balance to deal with, as they would be able to give a reduction of 5d. per 1000 feet, the same as last year. He was still satisfied that the taking over of the gas-works was a proper thing for the town. They had had a fair profit for two years, and but for the rise in the price of coal they would have made sure of getting profit for some time. This same cause prevented him from making arrangements for relieving the consumers of the meter-rents. Of the net profits, one-half would of course go to the Town Council, and the other to the consumers in the shape of a rebate. Mr. Dickson characterized the statement as satisfactory, and the transfer of the works as a measure that had been most beneficial to the town. They were, he said, indebted to Provost Muir for the way in which he had carried out the transfer. A short discussion took place, during which Mr. Matthews and Mr. Porter complained of the gas being bad, and of the gas accounts having been more than they were last year, to which the Provost replied that the state of the weather during last winter accounted in a great measure for the increased accounts, and also stated that a more frequent renewal of the burners would keep the gas accounts lower. The accounts were passed, and the meeting adjourned.

THE WIMBLEDON SEWAGE SCHEME.

Government Inquiry.

An inquiry was opened at the Lecture Hall on July 19, by Arnold Taylor, Esq., Government Inspector, in accordance with a notice which stated that two petitions had been addressed to the Local Government Board by the Wimbledon Local Board. The first prayed for authority to put in force the powers of the Lands Clauses Consolidation Act with respect to certain lands required for sewage outfall and precipitation; and the second for sanction to borrow £35,000 for the execution of a system of main sewerage and sewage outfall works.

Mr. Besley, barrister, appeared in support of the petitions; and those in opposition were, Mr. Harrison, on behalf of Mr. Drax, owner of land at the western outfall; Mr. Wyke Smith and Mr. Bazalgette for the Metropolitan Board of Works; Mr. F. J. Smith and Mr. Corsellis for the Wandsworth District Board; and Mr. Knight, an owner of land at the eastern outfall, appeared in his own interest, but said he should be represented by a solicitor on the next occasion.

The inquiry was watched with much interest, and it possesses importance from the fact that no scheme for dealing with sewage under the system proposed by Wimbledon has yet been sanctioned by Parliament, although there is a similar system in work at Merthyr Tydvil.

The Inspector having stated the purpose for which the inquiry was held, mentioned that petitions in opposition had been received from Mr. Drax, owner of land proposed to be taken for the eastern outfall; from the Wandsworth District Board, and from the inhabitants of Wandsworth.

The *locus standi* of the Wandsworth District Board was questioned by Mr. Besley, who also objected to the appearance of the Metropolitan Board of Works. In that body, Mr. Wyke Smith said, the Wandle and Beverley Brooks (proposed to be used as outfalls for the effluent water) were vested, and after a long argument it was decided that both bodies should be allowed to cross-examine the witnesses and produce evidence.

Mr. Besley then briefly explained the scheme, and stated that Dr. Frankland would be called to give evidence in favour of it. He believed it would be conceded by professional men that there were only two means of getting rid of sewage satisfactorily—irrigation, and downward intermittent filtration; and as the former required a very large amount of land, and there was much difficulty in getting it, the latter, which was more suited to a place like Wimbledon had been chosen. It was a scheme to which Dr. Frankland had pledged his reputation. The sewage was first dealt with by the addition of lime, and the suspended matters allowed to deposit before it was applied to the land. Downward intermittent filtration meant that the sewage was filtered through six feet of earth; and upon the ridges of the filters crops were grown; and the effluent water that flowed away was as clear as that in the bottle on the table. Having referred to the fact that a similar scheme was in operation at Merthyr Tydvil, Mr. Besley suggested that Mr. Rowell, a surveyor to the Wimbledon Board, should be first examined as to the plans only; and after Dr. Frankland's examination as to the scheme itself he could be called again if necessary. This was agreed to.

Mr. *Rowell* having deposed as to the plans produced (nine in number), was cross-examined by Mr. F. J. Smith, and said: I devised the scheme. At the western outfall we propose to drain into Beverley Brook. At the eastern outfall we propose to have a deposit-tank above the level of the water; and in all respects they are exactly similar to those at the outfall. We propose to take ten acres of land at each outfall. Our sewage could not be taken from the whole district to one outfall by gravitation. The water level of the deposit-tank at the eastern outfall, when filled, will be 34 feet above Ordnance data; and at the western, 40 feet. I know that the water of the Wandle is blocked up by the mills below the outfall. It is thoroughly impracticable to carry the whole sewage to one outfall without pumping. It is not desirable in an engineering point of view to do so, because it will divert the natural fall of the water, and flood that district, as each district only has provision for getting rid of its own water. I do not anticipate a drop of overflow, at the western outfall; if the boundary is retained, each valley will do its own work. The area of the land does not enter into the question. There has been no overflow of the Wandle for the last two years. I have been there after heavy rains to see. That, however, will not interfere with the flow from the proposed works. To get the six feet of filtration, shown on the plan, the ground will have to be raised two feet. The material to be used for this will be selected from the materials excavated in making the sewers and works. If any other place were adopted for the outfall, the sewage would have to be raised by machinery. The spot chosen for the eastern outfall is the best because no machinery is required, the sewage flowing by gravitation. Were all the sewage to be taken to Beverley Brook, the bridges over it would have to be enlarged. I have not heard of a scheme for draining the whole of what is called the Thames Valley district, with the exception of Mr. Bazalgette's. It would not be a more satisfactory thing for the pockets of the ratepayers here for some grand scheme to be provided.

Mr. Bazalgette was about to cross-examine Mr. Rowell, when the inspector said it would be well if that were confined to the legal gentlemen who represented the different parties interested.

Mr. Wyke Smith said that the streams proposed for the Wimbledon sewage to be drained into were vested in the Board of Works, who had constructed works to carry away the sewage from the Thames. If he understood this scheme, the sewage of Wimbledon was proposed to be thrown into the Thames. He desired that Mr. Bazalgette might be allowed to ask questions, as they had not seen the plans nor heard the details of the scheme.

Mr. Besley objected to representatives of two boards appearing with regard to the Wandle, but the inspector did not entertain the objection.

Mr. Smith said he wished to call Mr. Bazalgette as a witness, and he should probably first ask that the inquiry might be adjourned for the plans to be examined by him, as he was their engineer.

Mr. Harrison and Mr. F. Smith were also in favour of an adjournment.

Mr. Besley said if there were any chance of concentrating the matter, and shortening the inquiry by adjourning it, he should advise his clients to agree to it. As to allowing Mr. Bazalgette to conduct the cross-examination of the witnesses, it was quite unprofessional.

Mr. Wyke Smith thought they might go on for the present and get all the information they could, and then have an adjournment to give an opportunity of examining the plans.

Mr. *Rowell* was then cross-examined by Mr. Harrison. His answers were mainly in confirmation of his statements in the previous cross-examination.

By Mr. Knight: It is proposed to take your land for the eastern outfall; the whole of it is in Wimbledon parish. I have not seen posts in your land marking the boundary of Wandsworth parish. Did not during last winter see the land flooded to the depth of two feet. Know that the Wimbledon Lake flows into the Wandle. Consider that the outfall will not interfere with your mill in any way. Could not possibly construct the works at the Wimbledon lake; and it would certainly not drain the whole of this district without pumping. Have heard that there has been a large farm for sale in the parish.

Mr. Bazalgette again asked to be allowed to put two or three questions; but Mr. Besley still objected.

Mr. Wyke Smith said it would not occur on another occasion, as they would have the opportunity of seeing the plans and making themselves acquainted with the matter.

Mr. Besley suggested that the cross-examination should be confined to one. The board would not object to an adjournment, if it would shorten the affair; as they desired to get it through Parliament this session.

The Inspector said that was impossible; and——

Mr. F. G. Smith said if it proceeded so far they should oppose the bil in the parliamentary committee.

Mr. Wyke Smith stated that if Mr. Bazalgette were allowed to put the question he would undertake that they would not cross-examine another witness that day.

Mr. Besley asked, as it was impossible to conclude that day, that the proceedings should be adjourned to give the Metropolitan Board an opportunity of examining the plans.

The Inspector, however, would not hear of an adjournment at that period, and upon the objection to Mr. Bazalgette putting questions being withdrawn,

Col. Cole observed they had nothing to do with the Metropolitan Board, nor did they intend to get into their clutches. His belief was that the portion of the river Wandle where the eastern outfall was situated, was not in the district over which the Metropolitan Board had control.

Mr. *Rowell*, cross-examined by Mr. Bazalgette, said the population of Wimbledon was 10,000; it had nearly doubled itself in ten years. He could not exactly tell the quantity of sewage that would pass through the sewers, but had designed them for a larger population. The works at each outfall were for 15,000 people, but the sewers for each were sufficient for double that number. Had provided for 30 gallons of sewage per head per day. The present outfalls for the sewage were into the Wandle and Beverley Brook, and a small portion into the lake. The sewage at present flowed in open channels through sandy loam, not very porous, to the Beverley Brook. He thought the sewage would flow more rapidly through covered sewers than in open channels. The flow would not be in the same proportion throughout the day. The velocity of the current of sewage did not interfere with the rate of filtration, as they had perfect control over it, and could let it go into the Beverley Brook as they pleased. They took in some of the rain water. Reservoirs, the capacity of which amounted to half a million gallons each, were provided at each outfall. Was not aware that the roads out of the Wimbledon district were frequently flooded by the Wandle. At the eastern outfall, if the Wandle rose very high, a self-acting valve would be closed and stop the flow. If the water were higher than the level of the filter-beds, artificial filter-beds were provided so that they could be used when it was impossible to use the natural ones. His experience as to filtering sewage was at Ealing, during five or six years, where he designed the works.

Re-examined: The flow of the sewage is very insignificant at night, not equal at the eastern outfall to a tenth part of what provision is made for. Assuming that there is no probability of an increase of population in the same ratio as during the last 10 years, the works would be sufficient for the next 15 years; but the sewers would accommodate double the number for which provision is made in the tanks. Both the Beverley Brook and the Wandle would be vastly improved by the carrying out the scheme. Did not contemplate that any of the consequences suggested by Mr. Knight would happen to his mill. Taking the whole sewage to Beverley Brook would entail a very heavy and continuous expense for pumping; and any scheme such as the grand scheme referred to would also cause a continuous expense, inasmuch as machinery would have to be provided. Several attempts have been made to procure land for irrigation purposes, but they had failed. His observations as to the overflow of the Wandle applied only to Wimbledon.

Dr. *Frankland* was then called, and said he had made a special study for many years of the purification of rivers from sewage. He was applied to by the clerk of the Wimbledon Local Board, and on April 15, 1872, he made the report that had been read. In his judgment, from having investigated all the processes for dealing with sewage, he could say that irrigation and intermittent filtration were the only systems to be depended upon. It required for irrigation one acre of land to every 50 or 100 persons. It was impossible to deal with the whole of storm water in irrigation, as when it came down in large quantities it overwhelmed the works. In Wimbledon intermittent filtration was the only process that ought to be contemplated, for in such a place sufficient land could not be got, except at a great price, saddling the ratepayers with a heavy expense. Had seen the works at Merthyr Tydvil, and root crops in good condition were growing on the filters. When he stood upon the filters he could not detect a smell. At Merthyr Tydvil the sewage was treated with lime, and underwent a very imperfect process of subsidence; but the arrangements proposed for Wimbledon were much superior. He had tested the Merthyr effluent water, and found it so efficiently purified that it might have been three times less pure, and still within the prescribed standard. If the solid matter in the subsidence tanks was removed within a reasonable time—three days in summer and a fortnight in winter—no nuisance would arise. The deposited matter might be used as manure, or for making cement; and he would recommend that it be used for the latter as the quickest way to deal with it and prevent nuisance. (Some bottles of effluent water from Merthyr were handed round the room; and Dr. Frankland, after examination, pronounced the water to be perfectly pure.)

Cross-examined by Mr. F. G. Smith: The specimens he saw of Wimbledon sewage were very poor in suspended matters, but might be rich in dissolved matters. He expected that there would be a considerable deposit in the subsidence tanks. The removal of the deposit would not create a nuisance. The authorities of Birmingham had brought a bill before Parliament for the disposal of sewage in that way, but it was rejected. He gave evidence in it. The physical properties of the land at the western outfall at Wimbledon were better than those at the eastern, as in the former the subsoil was gravel and in the latter loam, which was more retentive. He arrived at his conclusions as to the quantity of land required by experiment. Had worked at intermittent filtration for four years, and been acquainted with sewage matters for twenty. At Merthyr, from his information, the sewage of 40,000 people was dealt with Mr. Bailey Denton carried out the works. He recommended that 3½ more acres of land be purchased at the eastern outfall, to provide for the contingency of the land being choked, in order that a rest might then be given to it. He should prefer the filters being left out of the scheme, as the work could be done without their help. It would be but very few days in the year that the storm water would come down in such a quantity that it could not be dealt with.

Cross-examination continued: Assuming the water in the river to rise above the level of the filters, of course the working of them must be stopped for a short time till the flood went off. He should think the works might be made so that they might be flooded almost with impunity.

The Inspector said that if the question were asked for his benefit he might say that in all sewage systems there were times of heavy floods.

After Mr. F. G. Smith had asked questions as to land for sale in another part of the parish,

Dr. *Frankland* was cross-examined by Mr. Harrison, and said he made his report from his own observations of the physical and chemical nature of the sections of land sent to him. The sections sent were six inches square and were cut out at a depth of six feet—one section from each outfall; and the whole of the area of land was judged from these sections alone. Was not aware that there was much difference of opinion in regard to the process. When he said he preferred filtration to irrigation it was entirely upon the consideration of the cost. He found that where irrigation was conducted under circumstances like the present, it involved the town in debt. He had been informed that at Worthing it was entirely unremunerative. The plan

proposed had not been practically tried, except at Merthyr Tydvil; and the surveyor had given him the information that the sewage of 40,000 was dealt with there. At the request of Mr. Harrison, Dr. Frankland explained the process the sewage went through under the proposed system. He stated that the land at each outfall would be divided into two sections; and these sections again subdivided into four. The sewage would be applied again to each of these four in succession in turns of six hours duration, so that one of these subdivisions would filter sewage for six hours and then rest for 18.

Cross-examined by Mr. KNIGHT: The different qualities of soil differed as to their efficacy in filtering sewage. Gravel and sand were the most efficacious; clay was the worst. He should be surprised to hear that the land at the eastern outfall was a thick bed of clay; what was sent to him certainly was not.

Re-examined: The filters would help to increase the purity of the effluent water. By adding lime to the sewage you go one step towards making the cement, and, besides that, get double the quantity of lime out of the sewage.

Mr. *Harper*, surveyor to the Merthyr Tydvil Local Board, was next examined. He said that he was engineer to the sewage works at Merthyr, where the sewage was first treated with lime, and the solid matter which was deposited collected. The sewage water remaining was applied to land and vegetables which were grown upon the ridges of the filtering areas. These crops were valuable, as the productions of one plot had been recently sold at the rate of £43 3s. 4d. per acre; of another at the rate of £27; and of a third at £22 13s. 4d. (The witness produced a plan of the present works, and said additions had been made because of injunctions obtained against them.) The water now came from the filtering areas perfectly pure; and the specimens previously shown had been taken a fortnight since. Arrangement had been made to supply sewage to 200 acres more land. Farmers wished the sewage to be applied to their land, and paid the local board £1 for each crop to which it was so applied. If the works were carried out as proposed at Wimbledon he saw no difficulty in passing away pure effluent water. After giving evidence as to the removal of the deposit (called sludge) from the sewage, he stated that scarcely any smell arose from it.

Cross-examined by Mr. F. G. SMITH: The water is so pure that the men employed on the works often drink it. He had drank it himself.

In cross-examination by Mr. HARRISON, the witness said that the Merthyr board procured powers to take 396 acres of land for sewage purposes; but the plan of intermittent filtration had proved so successful that they had abandoned the taking of 112 acres of that. This year they expected to make a profit.

Mr. BESLEY closed his case by re-examining Mr. Harper; and the question of adjourning the inquiry again arose. The inspector was in favour of continuing the inquiry next day, but as most of the gentlemen present could not attend, it was adjourned for a little over a fortnight, and Mr. Bazalgette was to examine the plans in the meantime. Col. Cole protested against so long an adjournment, merely that Mr. Bazalgette might examine the plans.

OPENING OF THE NEW GAS-WORKS AT AUDLEM, CHESHIRE.—This event was celebrated by a dinner at the Crown Hotel, on Thursday, July 18, the chairman of the directors of the company (Mr. Heath) presiding. The contractors for the works, as well as for the service-pipes and gas-fittings in the town, were Messrs Willey and Ford, gas engineers of Exeter, who were highly complimented on this occasion for the satisfactory manner in which they have completed the undertaking. These gentlemen are under contract to construct the new works for lighting the town of Brosely, Staffordshire.

DEWSBURY AND BATLEY GAS COMPANY.—A special general meeting of the shareholders in this company took place on the 22nd inst.—Mr. H. Hemingway presiding—for the purpose of deciding whether and to what extent the borrowing powers of the company should be exercised, and whether, instead of borrowing, the money should be raised by the creation of new shares. Mr. Shepherd stated that the company could only raise £18,000, and the directors wanted that amount to pay for works in progress, for the erection of coal-sheds, &c. He moved that £5 shares be created, and issued to the shareholders to that amount; and the resolution having been seconded by Mr. Jubb, was carried unanimously. It was also resolved to recommend the directors to issue the shares amongst the proprietors of the company at the rate of one new to six old shares, taking no notice of less than six in the possession of one shareholder, and to sell the surplus (52) by auction.

KIRRIEMUIR GAS COMPANY.—The annual meeting of this company was held on the 11th inst.—Mr. James Ogilvy presiding. The financial report for the past year was found satisfactory, and the usual dividend of 6 per cent. was declared. Owing to the great rise in the price of coals a shareholder proposed that the price of gas should be raised 5d. per 1000 cubic feet, being the price previous to the reduction last year. The meeting, however, considered that, owing to the forethought of their manager, Mr. Adam, having contracted for a supply of coals previous to the late rise in price, it would be more advisable to let the price remain as at present—viz., 7s. 11d. per 1000 feet. On the recommendation of the manager, it was agreed to give the workmen an advance of 1s. on their weekly wages. The retiring directors were re-elected; and, after passing votes of thanks to their manager and the chairman, the directors made an inspection of the works, which they found in a satisfactory state, several new retorts having been added in contemplation of an increased consumption during the ensuing year.

BERWICK GAS COMPANY.—The annual meeting of the Berwick and Tweedmouth Gas Company was held on the 19th inst. Mr. Davidson, chairman of directors, presided, and said that the high price of coal would in all likelihood have the effect of increasing the price of gas. Last year they had reduced the price from 6s. 3d. to 5s. 10d., and they expected that this would have caused an increased consumption. That, however, had not been the case, and they can this year only declare a dividend of 9 per cent., instead of 10, as in former years. The secretary read the annual report and balance-sheet, from which it appeared that the amount received for gas consumed during the year was £3346 5s. 5d., and for the use of meters £190 2s. 9d. The total income for the year had been £3768 4s. 11d., and, after paying all expenses, there remained a net profit of £991 1s. 1d., with which the directors recommended the payment of a dividend of 9 per cent. The chairman moved the adoption of the report, which was seconded by the Mayor of Berwick, and unanimously agreed to. The retiring directors were re-elected, as was also the auditor.

SUPPLY OF GAS TO SOUTHMINSTER (ESSEX)—INCREASE OF PRICE BY AGREEMENT.—A meeting of the directors of the gas company, and of the consumers, was held last week to decide whether, in consequence of the advance in the price of gas coal, the consumers would agree to an increase in the price of gas, or submit to the works being closed—Mr. Kemp in the chair. The chairman said the object of the directors in inviting the consumers and inhabitants was to hear and discuss the question of keeping open the gas-works of Southminster, inasmuch as it appeared to him almost impossible, in consequence of the very large increase in the value of coal, if they did not make some little alteration in the charge for the gas. From the way in which the gas company had conducted the business, they had received but a minimum profit on their capital, and the inhabitants would feel that they had acted generously, and that they did not wish to make a great profit at the expense of the consumers. That was the position of the company, and it was for them as consumers to take it into consideration. Mr. G. Richardson said it was a question of some moment to others. They commenced the company and carried on the works for about seven years, and they had not received 1 per cent. on an average. If the consumers did not think it to their interest that the price of gas should be increased, he as a shareholder should say it then became a grave consideration with the shareholders as to closing the works. If they were closed it was quite a question whether they would ever be opened again. Whatever increase was now made, he intimated, would only last so long as the present high price of coal. In the event of the reduction of coals a corresponding reduction would be made in the price of gas. After some further conversation it was unanimously resolved—"That owing to the sudden rise and unprecedented high price of gas-coal the price of gas be increased from 7s. 6d to 10s. per 1000 feet, to date from June 25."

WISBECH GAS COMPANY.—The ordinary general meeting of shareholders was held on Thursday, July 25—Mr. G. Dawbarn presiding. The report stated that the affairs of the company are in a prosperous state, notwithstanding the extraordinary increase in the price of coal and materials generally. The balance available for dividend, as shown in the balance-sheet, was £1186 12s. 7d. The directors recommended that a dividend of 10 per cent. on the paid-up capital of the company, free of income-tax, should be paid, which would absorb £1000, the balance to be carried to the credit of the next year's account. The contract with the Local Board of Health for the Wisbech and Walsoken district for the supply of gas to the public lights expired on the 31st of July inst. A new contract for the ensuing three years had been entered into, on the same terms, except that either party had power to determine the contract at the end of the first or second year, by giving three calendar months notice in writing to the other party. It was a matter of serious consideration with the directors whether, considering the increased and increasing cost in the production and distribution of gas, they were justified in tendering for the supply on the same terms as heretofore, and they ultimately resolved to do so, in the hope that the present extraordinary prices were only temporary.

SUPPLY OF GAS AT WHITEHAVEN.—At a special meeting of the trustees of the town and harbour, held on the 22nd inst.—Mr. Lindow in the chair—the secretary stated that two tenders had been received for lighting the lamps. The Gaslight Company, Limited, in their tender, dated the 8th of July, intimated that they would undertake the lighting, cleaning, and repairing of the town and harbour lamps in the north section, according to the specification, at the following rates, provided the trustees renew "all such lamps, services, brackets, and posts, as in the opinion of the directors are or may become worn out and unfit for further use, namely—

31 harbour batswing lights, at £5	...	...	...	...	...	£155	0	0
160 town batswing lights, at £4 9s. 6d. each			...	...	...	716	0	0
21 town fishtail lights, at £2 16s.	...	...	...	...	...	58	16	0
						£929	16	0

And all gas supplied through meters at 4s. 2d. per 1000 cubic feet. The tender of the consumers company was for the lamps in the south section, and was similar in its terms to that of the other company. The secretary also read the following letter:—"Whitehaven Gaslight Consumers Company, Limited, Whitehaven, July 20, 1872.—To the Trustees of the Town and Harbour of Whitehaven. Gentlemen,—I am instructed to inform you that since this company's tender of the 8th inst. for lighting the town and harbour lamps was sent in, the price of coals has been advanced 1s. 8d. per ton, in consequence of which the price for lighting the lamps will be:—Harbour batswing lamps, £5 5s. each; town batswing lamps, £4 14s. each; town fishtail lamps, £2 18s. 6d. each.—I am, &c., S. Studholm, Manager." The other company also sent a similar intimation. In answer to Mr. Jackson, the secretary said the harbour lamps were lighted according to the tenders now sent in. In answer to questions from several members, the secretary said that by the amended tender the total sum to be paid to the old company would be £976 3s. 6d., instead of £929 16s., as in the first tender. The total to be paid to the new company under its amended tender would be about £1066 12s. The new company had not given the number of lamps, so he could not give the exact figures. Last year the tender was as follows:—£4 for harbour batswing; £3 11s. 6d. for town batswing; and £2 5s. for town fishtail. Mr. Jackson: Does any company tender for both sections? The Secretary: No; one tenders for the north section, and the other for the south. The Chairman: I can see no other course to adopt but to accept the tenders at once, lest another rise take place. I propose that both the tenders be accepted. Mr. Jackson seconded the motion, which was agreed to. Mr. Hodgson: While we are on this subject, I should like to say a few words. I think you have adopted a wise and proper course, because since last meeting there has been an advance of 1s. 8d. per ton in the price of coals, which, I may say, are now 60 per cent. higher than they were this time last year, when the previous tenders were accepted. The advance on the public lamps is only half of that—namely, 30 per cent. Therefore, although the advance in the price of gas may appear large, it is only half of the advance on coals; and that notwithstanding the fact that there has also been an advance of 25 per cent. in the price of labour, and in all the materials that are used.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS—ANNUAL MEETING.—The eleventh annual general meeting of the North British Association of Gas Managers was held on the 19th inst., in the Rector's Class-Room, Seminaries, Perth. Mr. J. K. Watson, Edinburgh, President of the Association, occupied the chair; and there was a very large attendance of members. The secretary (Mr. Mackenzie, Dunfermline) read the minutes of the last general meeting, and those of committee meetings since that time—all of them being approved of. On the motion of Mr. Reid, Edinburgh, it was agreed to adopt the recommendation of the committee that the next annual meeting of the Association be held in Edinburgh, simultaneously with the meeting there of the British Association of Gas Managers, with which society the North British Association wishes to amalgamate. Messrs. W. Foulis, Glasgow; John M'Crae, Dundee; James Page, Strathmiglo; Henry Landale, Leven; Hugh M'Gillivray, Blairgowrie; James Watson, Grahamston; Thomas D. Hall, jun., St. Andrews; J. Alexander, Corstorphine; and John Swan, Kingskettle, were unanimously admitted members; and Messrs. D. B. Peebles, Henry Mungall, Cowdenbeath Collieries; R. B. Symington, Lochore and Capledrae Collieries; and D. Blackie, Edinburgh, were admitted extraordinary members. Mr. B. M. M'Crae, Dundee, was elected president of the association for the ensuing year, and Mr. Foulis, Glasgow, was appointed vice-president. Mr. Mackenzie was re-elected secretary; and Messrs. Whimster, Perth; Watson, Edinburgh; Reid, Edinburgh; and Cusiter, Dalkeith, were appointed the committee of the association. The president, at the conclusion of his opening address, presented, on behalf of the members, a solid silver claret jug and salver to Mr. Mackenzie, in recognition of his services as secretary to the association during the past ten years. Mr. Alexander, Corstorphine, read a paper on "Shale as an Auxiliary in the Manufacture of Coal Gas;" Mr. Reid, Edinburgh, communicated a paper on "The Application of Hydrostatic Pressure for Lifting and Lowering the Heavy Iron Covers of Purifiers in Gas-Works;" and a paper on "The Explosion of Tubular Condenser at the Ayr Gas-Works" was read by Mr. L. Hislop, Ayr. Discussions took place on each of the papers, and those of Messrs. Alexander and Hislop were remitted to a committee for consideration. A cordial vote of thanks was given to the president, and to Dr. Thomas Miller for his kindness in granting the use of his class-room. A lecture on "The Employment of Paraffin Oil in the Manufacture of Coal Gas" was given as the close of the meeting by Dr. Stevenson Macadam, Edinburgh, and, a vote of thanks having been given to that gentleman, the proceedings terminated. In the evening the members of the association dined together in the Royal George Hotel.

GAS EXPLOSION AT HOLMFIRTH.—About seven o'clock on Saturday morning, July 13, an explosion of gas took place at the residence of Mr. Alfred Peacock Mellor, of Lane End, Holmfirth. It appears that alterations had recently been made at Mr. Mellor's, and the plumber had unconsciously left the gas not properly turned off. On Mr. Mellor striking a match to light the fire, the explosion occurred, the windows and doors were broken, and several articles of furniture were damaged. Mr. Mellor was also seriously burnt about the head and face.

THE SERIOUS EXPLOSION ON A STEAMER.—It will be in the recollection of our readers that a gas explosion of a somewhat serious character took place on board the steamship *Torino*, which was lying at the Tyne Dock, on the 11th inst., when three Italians, sailors, were seriously injured, and they were immediately conveyed to the Newcastle Infirmary. One of the men, named Testa Francisco, 20 years of age, died from the effects of his injuries on Friday, in the above institution.

FATAL ACCIDENT AT THE CREWS HOLE (BRISTOL) TAR AND RESIN WORKS.—An inquest was held, on the 6th inst., on the bodies of George Burges and William Iles, who perished in a resin-still at these works, which are the property of Messrs. Butler and Co. It appeared from the evidence adduced that the deceased men were boiler makers in the employ of Messrs. Phippa Bros., of Soundwell, and they commenced the work of repairing the still in question, which was of iron, on Thursday, the 27th of June. On Friday, the 5th inst., they went to work at six o'clock in the morning, but at breakfast-time, as they did not make their appearance as usual, search was made for them, and they were discovered sitting in the still, quite dead. The medical evidence went to show that their deaths were caused by an anomalous condition of the atmosphere in the shed in which the still was situate, and which prevented a free circulation of air in the still itself, so that the two poor fellows, having exhausted all the pure air contained within the vessel, were suffocated by the carbonic acid gas which had been given off from their own lungs. The still had a manhole open on the top, and several holes in the bottom, but no air passed through. There was an entire absence of noxious vapour from the still itself. Mr. W. Butler, the head partner of the firm, was present at the inquiry, and stated that he had been connected with the works for nearly 28 years, and no such accident had ever occurred there before. The jury returned a verdict of "Accidental suffocation;" and abstained from making any preventive suggestions, thinking the matter might be safely left in the hands of the firm. Mr. Butler promised that every measure should be taken to guard against the recurrence of similar catastrophes.

FURTHER ADVANCE IN PRICE OF TUBES.—At a meeting, held on Friday, in the Birmingham Chamber of Commerce, discounts from the list prices of iron tubes and fittings were reduced 5 per cent. all round. At the last meeting of the Iron Boiler Tube Association, the list prices were declared net, with a premium of 10 per cent. advance.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN JULY, 1872.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·13	0·104	0·147	0·002	13·7	3·4
West Middlesex	18·53	0·079	0·147	0·002	13·8	3·9
Southwark and Vauxhall	17·93	0·109	0·147	0·003	14·0	3·3
Chelsea	18·37	0·100	0·131	0·003	13·9	3·9
Lambeth	—	—	—	—	—	—
Other Companies.						
Kent	27·13	0·005	0·217	0·000	26·5	5·4
New River	17·87	0·013	0·147	0·000	13·7	3·2
East London	17·37	0·055	0·167	0·001	13·0	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, in that of the Chelsea Company. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 114,860,743 gallons, and the number of houses supplied was 496,495. This is at the rate of 35·2 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 26·1 gallons; but this includes the water used for the public fountains and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne.—HY. LETHEBY, M.B.

THE PURCHASE OF THE LINCOLN WATER-WORKS.—At a committee meeting of the local board, on Tuesday, the 16th inst., arrangements were made for borrowing £70,000 at 4½ per cent. per annum to pay for the water-works, to be repaid in the course of 50 years. The money has been obtained through a Liverpool firm.

KILMARNOCK WATER COMPANY.—The annual meeting was held on the 18th inst. The report of the directors showed that the business of the company for the year had been prosperous. The income from the domestic supply had been about £90 over last year, and that from meter supply nearly £65 increased. The amount of water in the reservoir was satisfactory. The income for the year was £2128 8s. 2d., and the expenditure £800 7s. 9s., leaving a net profit of £1328 0s. 5d. Out of the profit the directors recommend a dividend of 6½ per cent. (one-fourth more than last year), leaving £41 0s. 5d. to go to the reserve-fund.

DUNDEE WATER SUPPLY.—A meeting of the special committee of the Water Commissioners appointed to execute the new water-works was held, to consider reports by Messrs. Stewart and Leslie, the engineers, as to the quantity of water to be brought in as a first instalment, and the works to be executed at Lintrathen, was held on the 23rd inst. Mr. Stewart stated that, calculating the population at 120,000, and assuming an increase at the rate of 2 per cent., and the consumpt at 28 gallons per head per day, and increasing at the rate of 2 gallons per head per annum, it would be necessary, to meet the requirements of the town in 1887, to bring in not less than 5 million gallons a day, which, with the supply of 2½ or 3 million gallons from Monikie, would afford a daily supply of from 47 to 50 gallons per head per day. Mr. Watson, the water manager, had stated that the population within the area of distribution was 130,000, and, taking the increase of population at the same ratio as during the last ten years, the population in 1887 would be 190,000; and it would, therefore, be necessary to provide at present 7 million gallons. Under the circumstances, however, Mr. Stewart was of opinion that the quantity of 6 million gallons a day would be quite sufficient for a long time to come. It was ultimately agreed that the quantity to be brought in at first should be 8 million gallons.

WATER SUPPLY OF GLASGOW.—A special meeting of the Water Committee, for the purpose of considering the annual report, was held in the offices, Miller Street, on the 1st instant—Bailie Macdonald presiding. From the report it appeared that the rates levied during the past year were as follows, viz.:—The domestic water-rate within the limits of compulsory supply (the Ancient Royalty and Municipality), at 8d. in the pound; the public water-rate within said limits at 1d. in the pound; and the domestic water-rate on the north and south banks of the river Clyde, beyond the limits of the compulsory supply, at 1s. in the pound; and the rates and charges for supplies of water for trade and business purposes, according to a table revised and approved of on the 22nd of May, 1871, and duly published. The "Glasgow Water Account" was, as usual, brought to a balance on the 28th of May last, and instructions given for an abstract to be printed and circulated, all in terms of the statute. From the abstract it will be observed that—

The revenue collected during the year amounted to	£110,780 11 2
The expenditure, including annuities, interest on mortgage debt, and the amount carried to credit of sinking-fund account, has been	109,014 18 0
Surplus for the year 1871-72	£1,765 13 2
To which add surplus of previous year, as per last report ...	3,257 16 6
Total surplus, to be carried forward to next year's account	£5,023 9 8
The revenue for last year was	£110,780 11 2
Do. for previous year	108,152 16 0
Increase	£2,627 15 2
The expenditure for last year, exclusive of sinking-fund, was	97,262 8 5
Do. for previous year	93,647 9 1
Increase	£3,614 19 4

This increase of expenditure is more than accounted for by the payments made on account of the memorial fountain in Kelvingrove Park and the repairs on the embankment of the Waulkmill Glen reservoir, which together amount to £2767 17s. 4d. The sum of £11,752 9s. 7d. has been placed to the credit of the sinking-fund account, which now amounts to £23,000. The committee resolved to continue for the current year the public water-rate at 1d. in the pound, and the domestic water-rate at 8d. in the pound, within the limits of compulsory supply, and to reduce the domestic water-rate to 11d. in the pound beyond the limits of compulsory supply. *Works.*—The contracts for providing and laying two additional lines of 36-inch main pipes from the Mugdock reservoir to Canniesburn Toll, a distance of about 2½ miles, have been let. A number of the pipes have been delivered, and the contractor for the pipe-laying has commenced operations. The work is expected to be completed in March of next year. These pipes have been rendered necessary by the continued increase in the consumption of water in the city and suburbs. When they are laid, there will then be four lines of 36-inch pipes in the 2½ miles being operated on, as originally intended when the works were designed. The rapid increase of population in the vicinity of Govan has led the committee to lay a 24-inch pipe from the Gorbals main at Pollokshaws, by the Dumbreck Road, into the district. The work is completed, and the supply of water is much improved. The works connected with the repairs on the embankment of the Waulkmill Glen reservoir, at the Gorbals works, are well advanced. The reservoir was partly filled with water last spring, and the work is expected to be completed in time for its being entirely filled next winter. The memorial fountain in Kelvingrove Park is approaching completion, and is expected to be finished in the course of a few weeks. All the other works are in a satisfactory state of repair. During the past year pipes were laid and water introduced into the villages of Eastfield and Yoker. The extensions of piping during the past year were—

	Lineal Yards.	
On North Side—Mains	685	
Distributing pipes	12,070	
		12,755
On South Side—Mains	5,684	
Distributing pipes	7,850	
		13,434
Total		26,189

Or nearly 15 miles.

The old pipes lifted and replaced during the year were:—

	Lineal Yds.
On North Side	3373
On South Side	2440
Total	5822

Or 3·3 miles.

Water Supply.—The estimated average quantity of water sent into the city and suburbs during the past year was:—

	Gallons per Day.
From Lock Katrine	28,182,988
From Gorbals Works	3,792,591
Together	31,975,579
Estimated average for 1870-71	28,847,451
Increase per day	3,128,128

The committee again call attention to the great waste of water daily taking place on account of the defective condition of the water fittings and the careless use of them by the water consumers; and they urge upon every ratepayer to interest himself in the matter, and aid the committee in putting an end to such waste. The report was approved.

BERMONDSEY WATER SUPPLY.—The following is the conclusion of Major Bolton's report relating to the recent failure in the supply of water to Bermondsey:—The Southwark and Vauxhall Company has not at present any storeage for filtered water, but are now constructing at Nunhead, at a cost of about £230,000, two covered reservoirs, to contain 18,000,000 gallons of filtered water, and the work is under contract to be completed in about twelve months from this time, when the whole of the eastern district, which includes Bermondsey, will be supplied from these reservoirs by gravitation, and these reservoirs will contain rather more than two day's supply. As the result of this inquiry, I have to report my opinion that the complaints of the memorialists in regard to the quantity of water supplied by the Southwark and Vauxhall Company have been well founded, the supply of water having been greatly deficient on the 14th, 15th, and 16th inst.; and it is admitted on behalf of the company that a short supply was delivered on those days in a small part of Bermondsey owing to the rapid growth of vegetable matter in the filtering-beds from the sudden increase of heat and other exceptional causes, therefore, they have not at all times the means of affording to the whole of their widely extended district a sufficient supply of properly filtered water. The more general complaint, however, of insufficiency of supply is, in my opinion, in a great measure to be attributed to the badness of the fittings, and, more especially, to the objectionable system which exists in the district of supplying

several houses from one small service-pipe of only three-quarters of an inch diameter, and the serious attention of the vestry, the landlords, and the tenants themselves, as well as the water company, should be directed to this subject; although, whatever may be the shortcomings of the water company with regard to supply, they cannot be admitted as an excuse for the bad construction of the service, the imperfect fittings, and ignorance displayed as to their use, and the disgraceful condition of many of the cisterns. Most of the complainants stated that they had had to borrow water from their immediate neighbour or procure it from a distance, and thereby been greatly inconvenienced; thus, there evidently was water in the main, but insufficient pressure to supply all the houses. This inconvenience to the inhabitants would have been considerably abated if the water company had fixed several stand-pipes in the district, in the same way as would be done during a severe frost, and in the event of any future recurrence of deficient pressure, I strongly recommend that the company should do so at once, without waiting for any formal complaint. As, in exceptional cases like the present (*and provision must be made for exceptional cases*), it is evident that the Southwark and Vauxhall Company cannot properly meet the demand made upon its resources, therefore it is obvious that it must extend its operations. This is being partially done by the construction of the storage reservoirs for filtered water at Nunhead, but I am decidedly of opinion that this will not be found sufficient to ensure *at all times* a proper supply of good and effectually filtered water to its district; and I therefore beg to recommend that the company should provide a reservoir of large capacity near its point of intake, to enable it, when the river is in good condition, to impound and store water sufficient for several days' consumption, and thereby avoid taking water from the river when floods prevail. Thus the company would possess ample storeage, reservoir capacity, and be enabled to filter effectually, at a slow and careful rate, which cannot be done *at all times* under the existing arrangements. Finally, I beg to direct the attention of the Board of Trade and the Southwark and Vauxhall Water Company, to the remarks and recommendations made in my report of the 16th of February last, which run as follows:—"Filtration was made compulsory by the 4th clause of the Metropolis Water Act, 1852, which enacts that 'every company shall effectually filter all water supplied by them within the metropolis for domestic use before the same shall pass into the pipes for distribution.' In order that the water may be effectually filtered, and to enable the companies to fulfil the requirements of the Act, two things, above all, are essentially necessary—1st, a sufficient area of properly constructed filtering-beds; 2nd, that the rate of filtration be controlled and limited to a certain speed. I would, therefore, recommend that it should be imperative on every water company to provide ample filtering power by regulating its area of filtration, according to its distribution; a given area of filtering surface to a given quantity of water to be fixed at a minimum; while a 'standard of filtration,' regulating the quantity of water to be passed through a given area in a given time, should be fixed at a maximum. Suspicious or doubtful water, after such filtration, should be submitted to chemical analysis, and judged according to a standard of quality. I would also recommend that the water companies should possess a sufficient amount of storeage for either filtered or unfiltered water, the capacity of which to be regulated according to the quantity distributed, so that the necessity for the intake of turbid and muddy water during the time of extraordinary and heavy floods, tending to foul and choke the filters, may be avoided. Thus, by effectual filtration and sufficient storeage, a supply of usable and wholesome water may be ensured to the metropolis."

SEWAGE OF TOWNS.—On Wednesday, July 17, a meeting of municipal authorities and others interested in this question was held in Stafford House, by the kind permission of the owner, the Duke of Sutherland. The meeting was very well attended, and the chair was occupied by his grace. The immediate purpose for which the meeting was called was to discuss the plan of Major-General H. Y. B. Scott, for getting rid of such nuisances by fire; and to devise measures for applying the principle to the removal of the present difficulties. General Scott's process is in actual operation at Ealing, and the subject has been discussed by the Society of Arts and the Architectural Association, Conduit Street. The chairman expressed the pleasure with which he saw so large and intelligent a meeting assembled, and called on General Scott to explain his method of dealing with the question of sewage. General Scott proceeded to give a sketch of his plan, and the method adopted by him, which he thus summarized:—The sludge must be taken out of sewage water before employing it for irrigation. If the sledge be allowed to deposit on the land, it choked the pores of the soil and created an intolerable nuisance. Subsidence and straining without proper chemical precipitation did not efficiently clarify sewage water. When filtration was necessary for the complete purification of sewage, the better clarified the sewage water the less was the area of ground neccesary for the filtering-bed. The best clarified sewage was also the best for irrigation. Sludge deposits, whether dried or not, had little or no value as manure. The chief manurial value of sewage passed off with the liquid. He quoted the authorities of Mr. Hawksley, Dr. Frankland, Mr. Bramwell, Professor Abel, Dr. Odling, and others in favour of the system. His plan of precipitating with lime, or lime and clay, and the conversion of the deposit into lime or cement by calcination was strongly recommended, and the cement thus produced was very valuable, General Scott adding that he was at present getting £3 10s. a ton for it. The system was especially applicable to Birmingham. The plan of introducing the chemicals at a distance from the outfall, so as to mix them thoroughly with the sewage, cleanse the drains, and prevent the formation of sewer gases, was adopted. A great variety of remarks and questions on these several points, proceeding from Mr. Morgan (Barking), Mr. Hawksley, C.E., Mr. Rawlinson, C.E., Mr. Webster, Colonel Hogg, M.P., Mr. Bennett, Mr. W. Hogg, Mr. Jones (Ealing), Mr. Bramwell, C.E., Dr. Frankland, and others followed, which were answered by General Scott in clear and precise terms. There seemed to be a pretty general concurrence of opinion fn favour of General Scott's system. The chairman moved a vote of thanks to General Scott, whose plan of dealing with the sewage of large towns was the most practical and cheapest he had seen. He hoped to see it thoroughly examined and carried out on a larger scale. The motion was unanimously adopted. Mr. Graves, M.P., moved, and Mr. Cole, C.B., seconded, a vete of thanks to the noble chairman, who responded.

Register of New Patents.

2207.—NIELS JOCHUMSEN, of Leith, in the co. of Mid Lothian, N.B., for "*Improvements in valves applicable to pumps and other purposes.*" Provisional protection only obtained. Dated Aug. 22, 1871.

The feature of novelty which constitutes this invention is, the forming of the valves of combined wire-gauze and india-rubber.

2233.—FRANCIS PARRY, of Piccadilly, in the co. of Middlesex, gentleman, for "*Improvements in apparatus for drying precipitated sewage and other like substances.*" Provisional protection only obtained. Dated Aug 25, 1871.

This invention relates to a peculiar construction and arrangement of machinery or apparatus for drying precipitated sewage known as "mud," and applicable to the drying of other moist substances, and consists essentially of a large shallow receptacle of wrought-iron or other material, and of a circular form, resting upon wheels running upon a circular tramway, a slow rotatery motion being imparted to such receptacle by any convenient or well-known arrangement of gearing worked by steam or other power, or, if desired, the receptacle may stationary. Above this receptacle, there is fitted a stationary hood, which envelopes the entire area of the same, and inside this hood there is a conical chamber, communicating at its upper contracted portion with a hot air-pipe, or with a flue-pipe leading direct from a furnace. An intervening space is left between the hood and the inner conical chamber, up which the vapour and heated gases and air pass off to a chimney, and, if necessary, through a charcoal bed or other well-known means for deodorizing the same. The hot air should be forced down on to the surface of the "mud" or other substance to be dried, by means of a powerful draught obtained either by the use of a tall chimney, or by a fan or other blower, or both combined. On the underside of the said receptacle there is formed a steam-chamber, into which exhaust or other steam or hot air, if desired, enters by a central pipe, suitable cocks being provided for the escape of the water of condensation when steam is used. The "mud" is thus simultaneously subjected to top and bottom heat, and becomes dried in a very short time. The substance to be dried may be fed in either intermittently or continuously from a feed-box or trap, which fits into one side of the hood or cover, to which a spreader may also be attached, and by giving a sufficiently slow motion to the circular receptacle, the substance may be dried at one or more revolutions, the caked and dried substance being scraped off the bottom by a stationary scraper and discharged.

2243.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, the co. of Middlesex, major-general, C.B., for "*Improvement in the treatment of sewage.*" Patent dated Aug. 26, 1871.

According to this invention the solid matters are precipitated, and afterwards collected and dried on hot plates, and the carbonic acid gas which has combined with the lime is expelled by calcination.

2247.—KARL WENZEL ZENGER, professor of natural philosophy at the Polytechnic Institute of Prague, in Bohemia, in the empire of Austria, for "*A new method of manufacturing gas and graphite from mineral, vegetable, and animal coal, and from tar and other hydrocarbons.*" Patent dated Aug. 26, 1871.

The novelty of this invention is that instead of submitting the coal or other substance from which gas is to be obtained to the usual temperature in the retort or generator, and then purifying and conveying the gas to the gasometer as hitherto practised, the said retort or generator is heated to a much lower temperature than usual, and the gaseous products thereby obtained are passed to a second retort called the decomposer, which is heated to a red cherry heat (melting point of brass), whereby the said products are decomposed and converted chiefly into graphite, which is deposited in the decomposer and into gas, which latter may then be passed to the gasometer in the usual manner, or if intended for heating purposes, direct to the furnace in which it is to be used. The graphite obtained may be used for all purposes for which graphite (plumbago or black lead) has hitherto been used, but it is more especially intended for making crucibles, and retorts of various descriptions, and for lining furnaces.

2263.—WILLIAM WEBB, of 17, Evelyn Street, New Town, Deptford, in the co. of Kent, for "*Improvements in joints or connexions for uniting the ends of soft metal pipes to one another, and to other pipes and cocks and union-pieces.*" Patent dated Aug. 28, 1871.

These improvements consist in connecting soft metal pipes together by placing a metal collar over each end of the pipes and spreading out the ends, and then drawing them together by means of bolts and nuts.

2374.—HENRY BRIGHT, of Leamington, in the co. of Warwick, for "*Improvements in the means and apparatus for drying sewage and other matters, and destroying noxious vapours arising therefrom.*" Patent dated Aug. 30, 1871.

This invention consists in drying sewage and other matters by spreading the same on the floor of a closed room, into which air heated by a stove is caused to passed, while the air required for the combustion of the fuel in the stove is drawn off from the room through apertures in proximity to the layer of material to be dried, so that the offensive vapours with which this air becomes charged are entirely destroyed in being passed through the fire of the stove.

2381.—WILLIAM PURDHAM GOULDING, of 6, New Broad Street, in the City of London, for "*Improvements in packing for steam and other joints.*" Patent dated Sept. 9, 1871.

This invention describes forming a packing for steam and other joints from wood fibre, reduced to a pulp by dissolving out from it the silica, resin, and other impurities. The pulp is made up into boards or sheets, and is cut up into washers or packing-rings of the desired shape and size.

2383.—JOHN FLETCHER, of 6, Bridgewater Street, Broughton Road, Salford, in the co. of Lancaster, engineer and packing manufacturer, for "*Improvements in packing-rings for steam-engine, piston-rods, stuffing-boxes, pumps, and other similar purposes.*" Patent dated Sept. 9, 1871.

This invention relates to the mode of manufacturing the packing-rings known as "metallic wire gauze packing-rings," which metallic packing-rings are used for packing the pistons and stuffing-boxes of steam-egnines, the buckets of air and water pumps, and for other similar purposes.

In carrying out this invention instead of putting the wire gauze metallic lining (when folded and flattened) half way down the internal surface of the ring, and fastening only one side of the ring with one set or row of tongues of gauze wire, the inventor puts the gauze wire all through the whole depth of the ring, and fastens the gauze wire into the ring, as it is being made, with a double set of tongues of wire gauze, that is, two or more sets or rows on each side of the packing-ring, which tongues of wire gauze are fastened into the cotton cloth backing or any other suitable material, such as flax cloth or flax and cotton webbing, in various widths, as the ring is being manufactured, after having rolled up any number of folds of the metallic gauze wire and cotton cloth to make the packing-ring to any size required for the packing, and secured it well in with the two rows of tongues. The inventor stitches the ring quite through and all round with copper or any other sort of metal wire to prevent the gauze from drawing, thus well securing the packing-ring in one compact and secure ring.

2393.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*An improved mode of preventing the oxidation or corrosion of iron exposed to water or dampness.*" A communication. Patent dated Sept. 11, 1871.

It is proposed, according to this invention, to connect with the iron a metal or combination, or an alloy of metals which shall be electro positive with reference to iron.

2438.—WILLIAM PROSSER, of, Manchester, in the co. of Lancashire, for "*Improved apparatus for conducting and distributing fluids.*" Provisional protection only obtained. Dated Sept. 15, 1871.

An enlargement of a suitable form is made at the end of a pipe, and in this enlargement are placed a number of fingers of a suitable shape which are moveable. These ends break the stream of water into several smaller streams, these being further divided into fine spray by other fingers on the edge of the enlarged piece. The moveable fingers may be dispensed with by prolonging the fixed fingers to a greater or less extent according to the degree of fineness to which the water is to be distributed, or the first pipe may be continued into the enlargement and the moveable and fixed fingers dispensed with by making suitable openings near the base of the enlargement and closing up the mouth of the inner pipe, thus distributing the water through the space between the pipe and its enlargement.

2428.—WILLIAM HENRY WESTO, and MIGUEL PINDER, both of Walworth, in the co. of Surrey, for "*Improvements in or connected with overflow of waste-pipes for water-cisterns.*" Provisional protection only obtained. Dated Sept. 15, 1871.

This invention chiefly consists in means for allowing the water from the cistern to pass through porous material in order constantly to supply fresh water to the waste-trap; also in an improved waste-trap or overflow-pipe and trap combined.

2446.—DAVID BRUCE PEEBLES, of the Fountainbridge Works, Edinburgh, in the co. of Mid Lothian, North Britain, engineer, for "*Improvements in gas-regulators.*" Patent dated Sept. 16, 1871.

This invention has for its object to improve the class of gas-regulator in which a flexible diaphragm connected to a valve is acted on on one side by the gas passing through the valve, whilst the other side is acted on by the atmosphere.

One improvement consists in securing the edge of the diaphragm by gripping it between the surfaces of the joint by which the two parts of the casing are attached, such surfaces having one or more grooves and counterparts formed not only round the chamber, but also round the meeting orifices of the side passage by which the gas passes from beneath the diaphragm to the burner tube above. One or more finger holes are formed in the covering part of the casing to give easy access for adjusting the weight on the diaphragm, and a cover or hood is provided for closing the holes, such cover being by preference formed with a hollow projecting lip at its lower edge to admit air whilst excluding moisture.

A second improvement consists in making the diaphragm of bladder skin, or similar animal membrane, such membrane being kept from hardening by being impregnated with glycerine, or with a suitable deliquescent salt, and from decomposing by being treated with carbolic acid, creosote, or other suitable antiseptic.

APPLICATIONS FOR LETTERS PATENT.

2101.—WILLIAM HENRY BENNETT, of 42, Parliament Street, in the city of Westminster, patent agent, for "*Improvements in apparatus for lighting and extinguishing public and other gas lamps or lights.*" A communication. July 12, 1872.

2109.—EDMUND LLOYD OWEN, of Acton Lodge, Iron Acton, near Bristol, in the co. of Somerset, and GEORGE UNDERWOOD, of 21, Cornhill, in the City of London, for "*Improvements in the purification of gas.*" July 12, 1872.

2126.—RICHARD JAMES JOHNSON, of 10, Victoria Road, Hatcham, in the co. of Surrey, builder, for "*An improved method of sewer ventilation.*" July 15, 1872.

2141.—HENRY SYED COPLAND, of 1A, Duke Street, Adelphi, in the co. of Middlesex, civil engineer, for "*Improved apparatus for mixing precipitating materials with sewage, and removing deposits, which apparatus is applicable also for other purposes.*" July 17, 1872.

2151.—CHARLES JURRIAAN VIEHOFF, of Westeindo, Amsterdam, in the kingdom of Holland, and ERNST VOSS, of Hoafdgracht Nieuwediep, in the kingdom of Holland, for "*Improvements in apparatus for ventilating ships, railway carriages, houses, and other buildings.*" July 18, 1872.

2179.—PETER LOVE, of Bedford, in the co. of Bedford, agricultural engineer, for "*Improvements in machinery or apparatus for excavating, especially applicable for drainage purposes.*" July 20, 1872.

2188.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus for raising liquids, grain, and other materials, parts of which improvements are applicable to the construction of rotary engines.*" A communication. July 22, 1872.

2194.—HENRY SUTCLIFFE and WRIGHT SUTCLIFFE, of Halifax, in the co. of York, sanitary engineers, for "*Improvements in moulding or constructing stench-traps or syphon-pipes.*" July 23, 1872.

2195.—WILLIAM THOMAS THOMPSON, of 85, Gracechurch Street, in the City of London, for "*An improved ventilating, disinfecting, and deodorizing apparatus.*" July 23, 1872.

2202.—JULES CORDIER, of 12, Rue de Marseille, Paris, France, manufacturer, for "*Improvements in the mode of reflecting, projecting, and diffusing light by means of globe reflectors.*" July 24, 1872.

GRANTS OF PROVISIONAL PROTECTION.

1720.—PAUL CHARPENTIER, of 17, Rue Vintimille, Paris, in the republic of France, civil engineer, for "*Improvements in apparatus for heating furnaces by gas.*" June 7, 1872.

1746.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in steam-pumps.*" A communication. June 10, 1872.

1789.—JOHN BROWNING, of 63, Strand, in the co. of Middlesex, optician, for "*Improvements in photometers.*" June 13, 1872.

1880.—WILLIAM MORGAN BROWN, of the firm of Brandon and Morgan Brown, 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris, engineers and patent agents, for "*An improved apparatus for extracting ammonia in the form of liquid ammonia from crude ammoniacal liquors.*" A communication. June 22, 1872.

1886.—JOHN THOMAS, of 83, Paul's Terrace, Middlesborough, in the co. of York, for "*Improvements in furnaces for generating gas and melting metals.*" June 22, 1872.

1898.—THOMAS ATKINS, of St. Albans, in the co. of Herts, civil engineer, for "*Improvements in pumps, parts of which improvements are also applicable to other purposes.*" June 24, 1872.

1899.—PAUL EMILE CHAPPIUS, of 69, Fleet Street, in the City of London, optician, for "*Improvements in the manufacture and application of reflecting surfaces for the better reflection and diffusion of light.*" June 24, 1872.

1900.—JUBAL SAGAR, of California, U.S.A., at present residing at Leeds, in the co. of York, for "*Improvements in machinery or apparatus for raising and forcing water or other fluids.*" June 24, 1872.

1931.—JOSEPH STEER CHRISTOPHER, of Lombard Court, in the City of London, gentleman, and JAMES FREDERICK LACKERSTEEN, also of the above address, civil engineer, for "*Improvements in the manufacture of hydrogen gas.*" June 26, 1872.

1936.—WILLIAM HEMPSON DENHAM, of Southsea, in the co. of Hants, PERCY VERE DENHAM, and ALGERNON ASTLEY DENHAM, of Putney, in the co. of Surrey, for "*Improvements in water-closets and in apparatus connected therewith, parts of which improvements are applicable to other purposes.*" June 26, 1872.

1940.—WILLIAM WRIGHT, of Sheffield, in the co. of York, plumber, for "*Improvements in taps and apparatus for flushing water-closets, and in taps for other purposes.*" June 27, 1872.

1945.—JOHN MILLWARD, of Curzon Chambers, Paradise Street, Birmingham, in the co. of Warwick, civil engineer, for "*Improvements in hydrants for supplying fire-engines from street-mains.*" A communication. June 27, 1872.

1947.—WALTER MANTELL PARKER and JOHN RENNIE ROBSON, both of Alton, in the co. of Hants, engineers, for "*Improvements in steam and other motive-power engines and pumps.*" June 27, 1872.

1956.—THOMAS HENRY PHILLIPS, of the firm of Phillips and Son, the Eagle Works, 25 and 26, Barbican, in the City of London, hot water and gas engineer, for "*Improved apparatus or appliances applicable for heating, cooking, and lighting purposes.*" June 28, 1872.

1964.—BARNABAS RUSS, of Lime Street, in the City of London, engineer, for "*Improvements in the manufacture of gas and in the treatment of the residues therefrom, in the means of purifying and rectifying the same, and in the combination or amalgamation of gases for the production of light and heat, and for other useful purposes, and in the machinery and apparatus to be employed therein.*" June 29, 1872.

1967.—WILLIAM CORP ROGERS, of 1, Basinghall Street, in the City of London, for "*Improved apparatus or appliances for regulating the supply or flow of gas to burners.*" June 29, 1872.

1982.—WILLIAM ROBERTSON, of Johnstone, in the co. of Renfrew, N.B., engineer, for "*A new or improved oscillating engine, suitable either as a steam or other pressure fluid-motor, or as a water or other fluid drawing and forcing pump or machine.*" A communication. July 1, 1872.

1990.—HENRY JAMES HOGG KING, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in apparatus for obtaining motive power for pumping or for measuring fluids.*" July 2, 1872.

1996.—JOHN MORCOMBE BROMLEY BAKER, of Lennox Road, Southsea, in the co. of Hants, for "*An improved disinfecting and deodorizing apparatus for water-closets and other purposes.*" July 2, 1872.

1999.—JOHN WALLACE, of 16, Grove Villas, Grove Street Road, N.E., for "*Improvements in gas-stoves and burners, and regulating apparatus to be used in connexion therewith.*" July 2, 1872.

2015.—SAMUEL JONES PAYNE, of Charlton, in the co. of Kent, fire-brick maker, for "*An improvement in the manufacture of fire-bricks, crucibles, retorts, and other fire-ware goods.*" July 3, 1872.

2017.—WILLIAM GORMAN, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in manufacturing iron and steel, and in apparatus connected therewith, part or parts of such improvements being applicable to various kinds of furnaces and for the production of gases for heating and illuminating purposes, and for coking, carbonizing, or calcining other substances.*" July 4, 1872.

2035.—BRERETON TODD, of 8, Victoria Square, Newcastle-upon-Tyne, for "*Improvements in the treatment of gases and fumes.*" July 5, 1872.

2045.—WALTER WILLIAM TONKIN, of 221, Brixton Road, London, engineer, for "*Improvements in the means of actuating the valves of engines, pumps, or liquid-meters.*" July 6, 1872.

2053.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*An improved ventilating apparatus.*" A communication. July 6, 1872.

2054.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in cooling air and gases and in the apparatus or means to be employed therein.*" A communication. July 8, 1872.

2058.—CHARLES DENTON ABEL, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, for "*An improved portable apparatus for impregnating air with hydrocarbon vapours or volatile oils for lighting and heating purposes.*" A communication. July 8, 1872.

2101.—WILLIAM HENRY BENNETT, of 42, Parliament Street, in the city of Westminster, patent agent, for "*Improvements in apparatus for lighting and extinguishing public and other gas-lamps or lights.*" A communication. July 12, 1872.

2109.—EDMUND LLOYD OWEN, of Acton Lodge, Iron Acton, near Bristol, in the co. of Somerset, and GEORGE UNDERWOOD, of 21, Cornhill, in the City of London, for "*Improvements in the purification of gas.*" July 12, 1872.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF A COMPLETE SPECIFICATION.

2014.—JOSEPH THOMAS PARLOUR, of Rutland Street, Pimlico, in the co. of Middlesex, civil engineer, for "*Improvements in apparatus to be used in the formation of asphalte and other pavements.*" July 3, 1872.

2065.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*An improved compound and method of preparing the same for the construction of street pavements, and other like purposes.*" A communication. July 9, 1872.

NOTICES TO PROCEED.

603.—ROBERT KING, trading under the style or firm of Tupper and Co., of Birmingham, in the co. of Warwick, galvanized iron manufacturers, for "*An improved portable closet or privy receptacle for sanitary purposes.*" Feb. 26, 1872.

607.—THOMAS BLUNDELL, GEORGE THOMAS BLUNDELL, and JAMES WALTER BLUNDELL, all of Limehouse, in the co. of Middlesex, engineers and coppersmiths, for "*Improvements in the construction of water-closets, and in the mode and means of regulating the supply of water to their pans.*" Feb. 26, 1872.

610.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in constructing asphalted roads, and in apparatus employed therein.*" A communication. Feb. 26, 1872.

616.—VICTOR BABLON, of 40, Rue du Roide Sicile, Paris, France, for "*Improvements in apparatus for measuring the delivery of gaseous fluid or other currents.*" Feb. 28, 1872.

714.—CYRUS AVERY, of Tunkhannock, Pennsylvania, U.S.A., now of Little Cross Street, Islington, in the co. of Middlesex, engineer, for "*Improvements in rotary steam-engines and pumps.*" March 8, 1872.

716.—JAMES HOLDEN, of 6, Hanover Quay, in the city of Dublin, Ireland, for "*A new or improved compound for use as pavement.*" March 8, 1872.

721.—WILLIAM GRAY, of Highwood House, Hendon, in the co. of Middlesex, for "*Improvements in rotary engines and pumps.*" March 8, 1872.

727.—JOHN FREDERICK COOKE FARQUHAR, of 24, Long Acre, in the co. of Middlesex, for "*Improvements in lighthouse and other lamps.*" March 9, 1872.

735.—CHARLES WEIGHTMAN HARRISON and ALFRED HORATIO HARRISON, both of Brooke Street, Holborn, in the co. of Middlesex, gentlemen, for "*Improvements in apparatus for heating and cooking by gas.*" March 9, 1872.

742.—JOHN BAILEY DENTON, of Whitehall Place, in the co. of Middlesex, civil engineer, and ROGERS FIELD, of Cannon Row, Westminster, in the co. of Middlesex, civil engineer, for "*Improvements in the method of regulating intermittent filtration of sewage and irrigation, and in apparatus for that purpose.*" March 11, 1872.

768.—THOMAS JAMES SMITH, of the firm of Robertson, Brooman, and Co., of 166, Fleet Street, in the City of London, patent agents, for "*Improvements in apparatus for the production of gases for heating and other purposes.*" A communication. March 14, 1872.

1032.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in the manufacture of illuminating gas, and in apparatus for the same.*" A communication. April 6, 1872.

1205.—WILLIAM FERRY, of the town and co. of Southampton, for "*Improvements in cistern filters.*" April 22, 1872.

1235.—WILLIAM CARTWRIGHT HOLMES, of 57, Gracechurch Street, in the City of London, and WILLIAM HOLLINSHEAD, of Peckham, in the co. of Surrey, for "*Improvements in the process of manufacturing gas, and in the apparatus employed therein.*" April 25, 1872.

1475.—ROBERT ALLAN, of Glasgow, in the co. of Lanark, N.B., merchant, for "*Improvements in reflectors for gas and other lights.*" A communication. May 15, 1872.

1663.—EDWARD RICHARD HOLLANDS, of 37, Newington Green, in the co. of Middlesex, WILLIAM MAKER, of 8, Milton Road, South Hornsey, in the co. of Middlesex, and CHARLES HENRY JEFFERIES, of 8, Milton Road, South Hornsey, in the co. of Middlesex, for "*Improvements in meters for measuring water and other fluids.*" June 1, 1872.

1752.—CHARLES FREDERICK HENGST, of Fulham, in the co. of Middlesex, engineer, and JOHN BEL MUSCHAMP, of Kensington, in the co. of Middlesex,

gentleman, for "*Improvements in the manufacture of gas, and in the apparatus employed therein.*" June 11, 1872.

1771.—Hugh Shanks, of South Queensferry, in the co. of Linlithgow, N.B., for "*Improvements in drawing retorts, and in the means employed therefor.*" June 12, 1872.

1836.—Thomas Lambert, of Short Street, New Cut, Lambeth, in the co. of Surrey, and Edwin James White, of Overton, Maisemore, in the co. of Gloucester, for "*Improvements in self-closing valves or cocks for drawing off water.*" June 18, 1872.

1880.—William Morgan Brown, of the firm of Brandon and Morgan Brown, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris, engineers and patent agents, for "*An improved apparatus for extracting ammonia in the form of liquid ammonia from crude ammoniacal liquors.*" A communication. June 22, 1872.

1886.—John Thomas, of 88, Paul's Terrace, Middlesborough, in the co. of York, for "*Improvements in furnaces for generating gas and melting metals.*" June 22, 1872.

1931.—Joseph Steer Christopher, of Lombard Court, in the City of London, gentleman, and James Frederick Lackerstein, also of the above address, civil engineer, for "*Improvements in the manufacture of hydrogen gas.*" June 26, 1872.

1964.—Barnabas Russ, of Lime Street, in the City of London, engineer, for "*Improvements in the manufacture of gas and in the treatment of the residues therefrom, in the means of purifying and rectifying the same, and in the combination or amalgamation of gases for the production of light and heat, and for other useful purposes, and in the machinery and apparatus to be employed therein.*" June 29, 1872.

2017.—William Gorman, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in manufacturing iron and steel, and in apparatus connected therewith, part or parts of such improvements being applicable to various kinds of furnaces, and for the production of gases for heating and illuminating purposes, and for coking, carbonizing, or calcining other substances.*" July 4, 1872.

NOTICE OF APPLICATION FOR LEAVE TO FILE A DISCLAIMER AND MEMORANDUM OF ALTERATION.

2865.—Alexander Horace Brandon, of 5, Quai de Paris, Rouen, France, civil engineer, for "*Improvements in the means or apparatus for producing the more complete combustion of gas, paraffin, and other hydrocarbon oils.*" A communication. June 5, 1872.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1711.—Carl Ostlund, "*Improvements in lamps for heating and lighting purposes, and in cooking and evaporating apparatus appertaining thereto.*" June 3, 1869.

1715.—John Lloyd, "*Improvements in the construction of fans for ventilating.*" June 3, 1869.

1816.—Edward Griffith Brewer, "*Improvements in connecting pipes or tubes.*" June 14, 1869.

1858.—Bristow Hunt, "*An improved apparatus for ventilating and purifying rooms or apartments.*" June 16, 1869.

1996.—Sam Smithson and George Senior and John Inman, "*Improvements in valves or valve-taps for regulating the discharge or flow of water or other fluids or gases.*" July 2, 1869.

2016.—John Hart, "*Improvements in the means of and apparatus for separating, distributing, and utilizing sewage.*" July 3, 1869.

2024.—William Robert Lake, "*Improvements in water-meters.*" July 5, 1869.

2036.—Leonard Clayton, Lawrence Clayton, and James Smith, "*Improvements in the construction of taps or valves.*" July 6, 1869.

2052.—Alfred Vincent Newton, "*Improvements in the construction of chandeliers.*" July 7, 1869.

2103.—Cleaveland Forbes Dunkerdale, "*An improved apparatus for generating hydrogen gas, and for carburetting hydrogen gas or atmospheric air for illuminating and other purposes.*" July 12, 1869.

2152.—Richard Brown Evered and Richard Hurst, "*Improvements in apparatus for raising, forcing, and regulating the flow of water.*" July 16, 1869.

2153.—Alexander Rollason, "*Improvements in the mode of extracting ammonia, purifying gas liquor, and utilizing the same.*" July 16, 1869.

Price Current.

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign.—*	Per Keel.
Chatham and Rochester	8s. 6d	Barcelona	£11 10s
Cork	9 3	Bordeaux	9 0
Dover, Folkestone, & Ramsgate	7 6	Boulogne and Calais	8 15
Dublin	8 6	Cadiz	£11 to 11 10
Exeter Quay	9 0	Cronstadt	12 5
Ipswich	6 9	Copenhagen	10 0
London (from Leith)	—	Genoa	20 0
London (Pool)	7 0	Hamburg	8 5
Lowestoft and Yarmouth	3 0	Havre de Grace	9 5
Portsmouth & Southampton	7 0	Leghorn	19 0
Plymouth	8 3	Lisbon	11 5
Shoreham	8 0	Rotterdam	8 10
Whitstable	7 3	Stettin	11 10
Weymouth	7 6	Trieste	20 10
		Venice	22 10

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	23 — 24
5000	20	Bahia (Limited)	20 0 0	3 0 0	11⅞— 12¼
1000	20	Do., preference	20 0 0	10 0 0	23 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	21 — 23
40000	5	Bombay (Limited)	5 0 0	6 15 0	6¼ — 6⅝
10000	5	Do., third issue	4 0 0	6 15 0	1—1⅛ pm.
10000	20	British (Limited). (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	35 — 36
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19 — 20
120000	10	*Chartered* A shares	10 0 0	10 0 0	15¼— 16
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	7 — 7⅛
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	13 — 14
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	3¼—3⅜ pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
12000	25	Do., D shares	25 0 0	10 0 0	48½— 49½
17490	100	*Commercial*	100 0 0	10 0 0	165 —167
20000	20	Continental Union	20 0 0	8 0 0	22 — 24
10000	20	Do., new	10 0 0	8 0 0	2 —3 pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	23 — 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16½— 17½
5000	10	Do., preference	10 0 0	6 0 0	11½— 12
6624	10	Do., new shares	10 0 0	7 0 0	13¾— 14¼
3376	10	Do.	1 0 0	7 0 0	1—1⅛ pm.
23406	10	European (Limited)	10 0 0	8 0 0	15½ — 16¼
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	8 0 0	3¼—3⅜ pm.
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13½— 14¼
1560000	100	*Imperial*	100 0 0	10 0 0	168 —170
26000	12½	Do., new shares	12 10 0	7 0 0	16 — 16½
25000	12½	Do., new shares, 1870	12 10 0	7 0 0	15½ — 16
1300	100	Do., bonds	£100	10 0 0	195 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	64 — 66
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	66 — 66
3000	10	Do.	10 0 0	5 0 0	7⅛— 8¼
3000	20	Do.	20 0 0	7 10 0	24⅜— 25⅜
250000	Sk.	*London*	100 0 0	10 0 0	163 —166
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 —120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
8000	10	Nictheroy, Brazil (Limited)	10 0 0		1½—⅝ dis.
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3⅞— 4¼
6000	5	Do., preference	5 0 0	7 0 0	5⅛— 5⅜
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2¼— 2⅜
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7¼— 7⅜
30000	5	Do., new shares	2 10 0	9 0 0	1¼—1⅜ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2¼
17500	10	Parà (Limited)	10 0 0	6 0 0	10 — 10½
27000	20	*Phœniz*	20 0 0	10 0 0	33¼— 34½
3600001.	100	Do., new	45 0 0	7 10 0	14—16 pm.
1440001.	Sk.	Do.	100 0 0	5 0 0	89 — 91
5000	20	*Ratcliff*	20 0 0	10 0 0	33 — 35
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	34 — 36
7359	5	Singapore (Limited)	5 0 0	7 0 0	5 — 5¼
2000	5	Do., preference	5 0 0	7 10 0	5⅝— 6
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	88 — 90
4000	12½	Do.	12 10 0	10 0 0	22 — 24
20000	12½	Do., new shares	2 10 0	10 0 0	5 —6 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16 — 17
10000	10	Do., new	6 0 0	10 0 0	4½— 5½
9000	4	United General (Limerick)	4 0 0	5 0 0	3 — 3¼
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	13 — 14
1500	10	Do.	10 0 0	7 10 0	7¼— 8
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
40000	10	Western (Limited) A, B, & C shares	10 0 0	10 0 0	16 — 17
20000	10	Do., D shares	1 0 0	10 0 0	3½—4 pm.
16000	5	*West Ham*	5 0 0	9 0 0	7⅛— 7⅜
10000	5	Do., new shares	1 0 0	9 0 0	1½— 1¾
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

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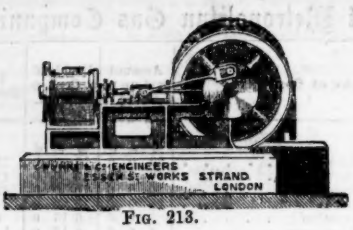

FIG. 213.

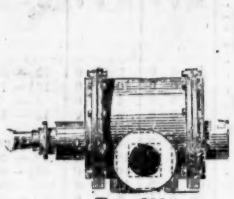
FIG. 211.

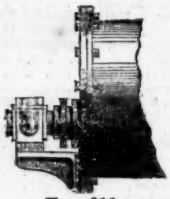
FIG. 219.

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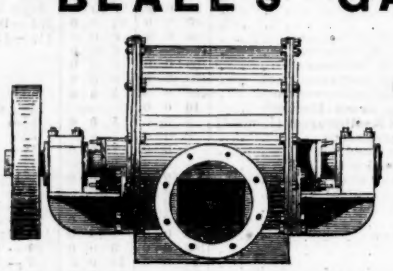

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PRICE LISTS ON APPLICATION.

CONTENTS.

	Page
Notes upon Passing Events:—	
The Public Health Act	681
The Licensing Act	681
The Strike in the Building Trade	681
The London School Board and Gratuitous Education	682
The Livery Companies and Technical Education	682
The South-Eastern Railway and the Channel Passage	682
The Price of Meat and Causes of it	682
Railway Amalgamations	683
Circular to Gas Companies:—	
The Municipal Corporations (Borough Funds) Act	683
The Public Health Act	684
The Sulphur Maximum in the Metropolis	684
Testing Stations in Want of Chemicals	684
The Patent Gas Company	684
Public Lighting at Sheerness	684
The Accounts of the Metropolitan Gas Companies	684
Advances in the Price of Gas	684
Dr. Odling's Lecture	684
The North British Association of Gas Managers	684
Correspondence:—	
The Hydraulic Main	685
Parliamentary Intelligence:—	
Progress of Bills in the House of Lords	685
Progress of Bills in the House of Commons	686
Legal Intelligence:—	
Rolls Court—North Staffordshire Railway Company *v.* The Tunstall Local Board of Health	687
Vice-Chancellor's Court—Bardwell *v.* Sheffield Water-Works Company	687
Middlesex Sessions—Robbery from the Imperial Gaslight Company	687
Surrey Assizes—Stevenson *v.* The Mayor, &c., of Ryde	687
Southampton County Bench—Charge of Defrauding the London and South-Western Railway Company	689
Miscellaneous News:—	
Water Supply of Kettering	686
Meeting of the Cambridge University and Town Gaslight Company	690
Meeting of the York Gas Company	691
Meeting of the Kidderminster Gaslight and Coke Company	692
Meeting of the Lewes Gas Company	692
Forfar Gas Corporation—Proposed Reduction in the Price of Gas	692
Meeting of the Hereford Corporation Gas-Works	693
Meeting of the Cambridge Water-Works Company	694
Meeting of the York Water-Works Company	694
Metropolitan Board of Works	695
Dr. Odling on Sulphide of Carbon	696
North British Association of Gas Managers	699
Malton (Yorkshire) Gas and Coke Company	701
Newcastle-under-Lyne Gas Company	701
Stockton Corporation Gas-Works	701
Supply of Gas to Dumfries	701
Price of Gas at Oldham	701
Suffocation by Gas	701
Public Lighting at Wakefield	701
Gas Supply of Hull	701
Public Lighting at Sheerness	701
Proposed Purchase of the Winchester Gas and Water-Works by the Corporation	701
Heckmondwike—Proposed Purchase of the Gas-Works by the Local Board	701
The Ryde Gas-Works Question	702
Kilmarnock Gas Company	702
Breaking Public Lamps at Edinburgh	702
Damage by the Storm at the Dewsholm (Glasgow) Gas-Works	702
Experiments on the Simultaneous Lighting of Lamps	702
Lincoln Water-Works Purchase	702
Conviction for Wasting Water	702
Wakefield Water-Works Company	702
Bermondsey Water Supply	702
Lambeth Water Supply	702
The Blackburn Sewage Question	702
The Purification of the Thames	702
Price Current	702
Share List of Metropolitan Gas Companies	703
Register of New Patents:—	
Clark, A. M.—Cocks or Valves	703
Pawson, W.—Taps or Valves	703
Pinn, C.—Preventing Waste of Water	703
Owen, J.—Filters	703
Parry, F.—Drying Sewage	703
Banks and Walker—Treatment of Sewage	703
Williamson and Glasier—Dry Closets	703
Smith, N. L. M.—Water-Meter	703
Applications for Letters Patent	703
Grants of Provisional Protection	704
Inventions protected for Six Months	704
Notices to Proceed	704

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

G. A.—*Your letter is under consideration.*

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 13, 1872.

Notes upon Passing Events.

The Public Health Bill has passed, and, whether its working justifies its name or not, it will be useful to know what it enacts:—

England is divided into two classes of sanitary districts—urban and rural—and each district will be subject to the jurisdiction of local sanitary authorities. In urban districts composed of ordinary boroughs the authority will be the mayor, aldermen, and burgesses, acting by the council. In rural districts the authority will be the Board of Guardians. To these authorities all the powers will at once attach which have been hitherto exercised by such bodies as Local Boards, sewer and nuisance authorities, and authorities for such purposes as those of the Common Lodging-houses Acts, the Diseases Prevention Act, or the Bakehouses Act; and they will enter alike upon the property and the obligations of all such bodies. They are to lose no time in setting to work, for they are to meet within 28 days after the passing of the Act; and it will be among their first duties to appoint a Medical Officer of Health for their district, who must be a qualified medical practitioner. This personage will exercise any of the powers with which an inspector of nuisances is now invested; and, since half his salary will be paid by the Government, there is reason to expect that efficient officers will be obtained. For convenience of administration, the full Board of Guardians may delegate its sanitary powers to a committee for the current year, and this committee may appoint parochial committees to execute its authority in the several parishes of which the union is composed. Inspectors from the Local Government Board will have the right to attend any meeting of the local authorities, and will have powers similar to those of Poor Law inspectors. By this means the Local Government Board will learn whether the subordinate authorities are doing their duty. Similar bodies are to be established by the Local Government Board with sanitary authority over our ports; and the Board will possess considerable powers for the alteration of areas and for the union of districts for convenience of administration. The Board also steps into the authority of the Home Secretary and of the Treasury in reference to the control instituted by some minor sanitary Acts; and on Jan. 1, 1873, it acquires the existing powers of the Board of Trade over the water companies of the metropolis. The expenditure of the district authorities will be charged to the contributory places in due proportion to the benefits derived from any improvements, and, to lighten the pressure of any necessary outlay, loans will be granted at moderate interest by the Public Works Loan Commissioners.

The very mild Publicans Licensing Bill has also passed through all its stages, and henceforward for some years—in fact, until the working man has learned the mischief of temptation at the corner of every street—the existing old-fashioned public-houses will continue to be rebuilt as palaces, and licences will rarely be refused when the applicant understands the art of canvassing the bench of magistrates—an act which great brewers and distillers have brought to a degree of perfection which almost leaves in the shade the science of electioneering agents in their palmiest days. No doubt the small committees of licensing magistrates will make the jobs more difficult, still the future will not be bad times for the prosperous publican. Sir Selwyn Ibbetson succeeded in dealing what would have been a deadly blow at that favourite object of the aversion of the barkeeper—the grocer—and for a day the *Morning Advertiser*—that organ of virtue and the licensed victuallers—triumphed greatly over the gain to "*the cause of* "*morality*," by abolishing the retail sale of bottles in favour of the publican. But on Wednesday, Mr. Bruce succeeded in extracting the sting from the clause which had been received with such uproaring exultation by the tap-tub interest. What sort of a Parliament we should have if it were composed entirely of the comfortable middle classes we may judge from the sympathies expressed at the recent conference of the Wesleyan Methodists. The Wesleyans are an eminently respectable, well-to-do, without being an inordinately rich class. They desire to stop Sunday trains for both passengers and goods. They find fault with Mr. Bruce for withdrawing the Licensing Bill, although his mild measure of this session has with difficulty survived the assaults of quarter sessions M.P.'s; and the Wesleyan ministers unanimously agreed on a petition for a repeal of the Contagious Diseases Acts. On this last question Mr. Bruce—who feels himself more firm in his saddle than he did at the beginning of the session—has recently answered a deputation of fanatics with unexpected clearness and decision:

Mr. Bruce said there was one matter to which he took objection—viz., the way in which the deputation put their case. While earnestly expressing their own opinions of the immoral tendency and wickedness of those Acts, and their tendency to endanger the religion and the morality of the population, they seemed to forget that they were supported by a great number of men whom, in all Christian charity, they must believe to be as good Christians, and as desirous for the good of their fellow-men as themselves. It had been said by the gentleman from Plymouth (where the Acts were in force) that the majority of the population were opposed to these Acts; yet it was undoubtedly true that a very large portion of the population viewed with very great apprehension, and even with terror and alarm, a return to the state of things which existed before these laws were in force. After a most careful examination of the working of the Acts, he maintained the views which he originally expressed—that they had done much positive good. It was always a mischief when an Act of Parliament did not carry with it the assent of the thinking part of the population; and though the discussion of these Acts was disagreeable, still he should have preferred it before these Acts had passed. He was not revealing a State secret when he said that a very large portion of the Government were of opinion that there was much in these Acts that was doing good, quite apart from their effect upon the army and navy. These were also the opinions of as good, earnest, Christian men as any in that room; and he hoped, therefore, that in the agitation which they had spoken of as about to begin, some regard would be paid to the sentiments of those who differed from them. He instanced the opposite views of Mr. Fawcett and Mrs. Garrett-Anderson on this subject as a warning that the deputation should be guarded and careful in expressing their opinions. He reminded them that a deputation of 154 members of Parliament had lately been before him (and that number could have been greatly added to, he believed) who were opposed to the repeal of the Acts.

The strike of the building trade has now arrived at a stage where compromise is no longer possible. The masters attacked have withdrawn to their tents, and the less important firms are getting as many men as they require at 8d. and 8½d. an hour;

U of M

whilst others, under heavy contracts, are picking out the best men at 9d., and getting rid of the old, the slow, the lazy, including many who had previously an implied claim—a sort of tenant right—to employment. The diminution in the value of gold, the rise in the price of the necessaries and luxuries of life, made an increase of wages inevitable. But the manner in which the agitation has been worked by professional and political agitators in town and in the rural districts will hasten a much-needed revision of the rules of administering out-door relief to the able-bodied. The guardians of more than one metropolitan Board have decided that no relief shall be allowed to any healthy member of the building trade. They decline to support a strike out of poor-rates! And the same line will be followed by rural guardians. The publicans, for the present, are getting the harvest of high wages. But the whole question will find its level as surely as water. Next winter will be a season of severe distress amongst the working classes of the metropolis, especially in the building trade. At present there is a considerable glut of carpenters. In the end, no doubt a high rate of money-wages will be maintained, but the wage-earners will learn by hard experience the absolute necessity of the thrift—of self-dependence—that means, in plain words, saving in good times to prepare for bad times.

The London School Board, wisely, as we consider, has decided not to take upon itself the boundless task of deciding whether every person pleading poverty, not being a pauper, shall be entitled to have his or her children gratuitously educated. It would have been better to have enacted at once gratuitous education, than to have decided otherwise. The whole time of the District Boards would have been consumed in vain attempts to distinguish between real distress and ingenious imposition, a struggle in which impostors would have had much the best of it. The lady M.D. put the whole question in unanswerable shape:

> Mrs. Garrett-Anderson thought it would be better to reject the report than to institute a grand scheme of collateral out-door relief for education only. She did not believe that these people lived on the sums put down. They all knew, for instance, that a charwoman had many perquisites. For one thing, she got her food, and a great deal of other help than was taken account of in the report. She was quite certain that in those cases the 5s. or 6s. a week mentioned was not the sole income of the family. Charwomen, too, took charge of empty houses, and thus frequently lived rent free. Where poverty was pressing, there was a considerable amount of money spent in comparative luxury; she was most certain that in these families 3d. or 4d. a week was spent in sweet-shops. That would be saved rather than the parents would go to the workhouse. They were fully occupied, and could not inquire into the truth or falsehood of allegations of poverty. They had better admit this, and throw on the Government the obligation of making a change.

A few of the minor Livery companies have been meeting to consider whether they could not do something by way of defending themselves from the onslaughts of such bodies as the Charity Commissioners and the Endowed Schools Commissioners, and such enemies as Sir Charles Trevelyan, by encouraging technical education. The majority of the speakers travelled in old grooves, and suggested such stuff as giving prizes for specimens of turning and carpenters work. The saddlers have got as far as a prize for a military saddle. The goldsmiths did not appear—content to simmer in their surplus wealth, after recently consuming a lump sum in a marble staircase. Perhaps the next generation may have solid silver steps, and silver-gilt balustrades. One speaker alone hit the right nail on the head. He suggested that if the Gresham Committee would only substitute teachers for lecturers, a great deal might be done. What is needed is not instruction in handicraft trades, that can only be really learned in the workshop, but an institution where, for fees within the reach of mechanics and clerks, the sciences and arts applied to trade and manufacture should be taught. Take chemistry, for instance, which requires most expensive appliances. In a word, a college of physical science, to which the Livery companies might attach any number of scholarships and fellowships for the reward of the poor, of whom one hears so much, when the school patronage of the Common Council class is touched. It is a disgrace to London that a small canton in Switzerland should possess educational advantages in physical science open to the poorest, while tens of thousands are wasted in creating paupers and feasting well-to-do shopkeepers in London. The Stationers Company stands alone. Four years ago they applied and obtained the sanction of the Court of Chancery for a scheme under which a useless school, with a few dozen half-taught scholars, was converted into a liberal and useful institution, to which about two hundred pupils resort. The head master, Mr. Isbister, in his annual report, states that—

> The course of education comprises instruction in the principles of the Christian religion, the English, Greek, Latin, French, and German languages, the physical sciences, history, geography, writing, and drawing. In teaching these subjects, the method adopted is that of our most successful public schools, modified where necessary by the circumstances and future destination of our pupils; the chief distinction in our system from that of older foundations consisting in the greater attention bestowed on those studies which have a direct application to the practical business of life. Every boy is taught, in addition to his own language, Latin and French. Drawing, which from its manifold applications in the various processes of mechanical and manufacturing industry, literature, and art, is yearly rising in importance as a branch of education, is taught to every boy in the school without extra charge; and special attention is paid to arithmetic, book-keeping, and good writing.

Sir Edward Watkin has been meeting the South-Eastern shareholders with a satisfactory balance-sheet. There is always some useful stuff in Sir Edward's speeches, although it is not always possible to take as flattering a view of his own administration as he does himself. He announced with pardonable self-satisfaction that Mr. Fowler's preposterous scheme for international communication across the Straits of Dover had been thrown out in the Lords. There is consequently a chance that the French, having no longer an excuse in the shape of expectations from the English Jupiter of engineers, may themselves put their shoulders to the wheel, and make the moderate alterations required for improving the Channel passage. First, to extend the rail at Boulogne down to the extremity of the Quai Bonaparte, "where, by the use of "steam cranes, the luggage in boxes could be removed and placed "on skeleton trucks, so that within a quarter of an hour, which the "passengers may spend in the refreshment-rooms or lavatories, "the train may be ready to start for Paris." This can be all done for £15,000. This is the first thing that Mr. Fowler's scheme stopped. The next point will be to improve the Boulogne Harbour, so as to make it fit for such boats as those now employed between Holyhead and Dublin. If that is done, the Dover Harbour Board, on condition that the railway companies pay a small additional toll, will lay out something like £200,000 to accommodate boats of the Holyhead class—that is, from 350 to 370 feet long. Mr. Fowler began by talking of boats 600 feet long, but finally subsided to the more moderate length of 450 feet. No one who has ever travelled by the Holyhead steamers can desire anything more comfortable, except those deluded souls who dream of crossing the Channel on stormy days without quitting a railway carriage, and without being either sick or in company with those who are sick. In the meantime, the South-Eastern Company have tried an experiment by employing Mr. Harland, of Belfast, to cover one of their boats, and alter the steering arrangements. If this alteration makes a deck passage more comfortable in rough weather, it will be an important step in advance. Sir Edward also referred to the failure of the rope system of communication between passengers and guards, and the return to the electric system originally adopted on the South-Eastern Railway.

The price of meat continues to make the consuming classes, especially of the labouring and lower middle class, extremely uncomfortable, and to cry out for the most absurd remedial schemes. The cause of the high prices lies within a very small compass. First and foremost is the demand for meat meals by millions, at home and abroad, who never dreamed of such a luxury five-and-twenty years ago—that is to say, just before the repeal of the corn laws. It is the requirements of the million, not of the upper ten thousand, which regulate demand and settle prices. Next come the effects of cattle diseases, the east of Europe cattle pest, and the less fatal, but equally infectious, foot and mouth disease. Our Government has only to comply with clamour of the ignorant multitude and interested cattle salesman, and remove all restrictions, a measure which would inevitably be followed by the same results as the repeal of the Vaccination Acts—a fearful spread of disease, an eventual enormous loss of meat-producing cattle—or to enforce the restrictions, and thus discourage importation and raise the price of the diminished supply. Mr. James Howard, an ambitious member of Parliament, who is, from his business, intimately acquainted with the condition of agriculture in the three kingdoms, yet not the least infected by agricultural prejudices, has very legitimately made the high price of meat the foundation for manufacturing a little political capital. He has brought down on himself the indignation of the *Saturday Reviewers*, who exhibit an amount of prejudice and a depth of ignorance not unusual in the treatment of technical subjects by that select company of literary augurs. The *Saturday* looks with intense contempt on the requirements of any one under the rank of £5000 a year, unless, indeed, he belongs to one of the learned professions, duly labelled with the honours of one of the two ancient English Universities. The *Saturday Reviewer* states that the theories of land tenure of Mr. James Howard (who has given notice that he will introduce a Bill in the next session for extending English tenant right) are more remote from the truth as to the price of meat than the mechanics who meet in Lancashire, and call for the abolition of all the animals contagious diseases restrictions The force of audacious assertion could not go much farther. To grow the largest quantity of meat on British soil requires the expenditure of a very large capital in live stock, in root cultivation, and, consequently, in implements, labour, artificial manures, and portable food, on the part of the farmer, and in suitable buildings, farm roads, and systematic drainage on the part of the landlord. In England, at any rate, nine-tenths of the farms are held on a tenancy at will; which is, practically, a tenancy for life for the

class of tenants who occupy—subject to perfect agreement on the two ticklish subjects of game and politics. But, although farmers of the old school will go on on this system of mutual confidence, farmers of capital will not commence with it. There is not much in the political question. Landlords, as a body, are Conservative, and tenants, except where a question of game is concerned, are more Conservative than their landlords. In the first place, then, there are a large body of landowners who have not the ready money for putting their farms in first-rate producing condition as regards buildings, labourers cottages (a large question), and drainage, even if they are inclined to permit hedgerows to be cleared away, ditches filled up, and all the preparations made for steam cultivation, which involve so considerable a sacrifice of game covert. In the next place, the very best class of farmers of the new generation—men with their three, five, and ten thousand pounds of capital—will not invest it to be at the mercy of a landlord, however benevolent, because the agent—the landlord *de facto*—may be a London lawyer or a fanatic gamekeeper. As we said once before, as long as it was only a question between the landlord and the tenant, the English and the Scotch tenants might safely be left to take care of themselves; but when it comes to the question of feeding England, a third power must be called in. It was only the other day that we heard of a landlord, in other relations of life liberal and sensible, the representative of an ancient name and family, declining to receive the son of a deceased tenant, a farmer of the very first class, because he declined to hold his farm under the orders of a head gamekeeper, declined to submit the cutting of his crops, the trimming of his hedges, and the clearing of his ditches to the autocrat velveteens. The love of power, and an insane passion for game preservation, are two diseases which seriously damage the many admirable qualities of our country gentry. The game mania is not confined to any particular class of political opinions. We could name staunch supporters of Mr. Gladstone, who are offenders in the highest degree, ready to sacrifice the cottages of the labourer and the crops of the farmer to a passion for pheasants and rabbits. We are sometimes told that if tenant rights are extended, and the increase of ground game checked, that landlords would take land into their own hands, and dispense with tenants. Such a result could only take effect with the smaller squirearchy, the owners of from one to two thousand of more or less encumbered acres. So far from such change being to be deprecated, it is rather one to be hailed with satisfaction. The gentleman who had to farm seriously, whose sons had to learn the art of agriculture, as the young German nobles do, would soon leaven the whole class, and create a degree of sympathy with agricultural progress, which is now more frequently found among the noble owners of great estates. It was not the Earl of Leicester, but a Norfolk baronet, who, in the county of Coke of Holkham, forbade the use of the reaping-machine or the mowing-machine, and prescribed a barren strip of weeds and grass in every field of corn.

The committee on the railway amalgamations have come to a series of conclusions, the most important of which—indeed, the one on which all the rest hang—is the creation of a Railway and Canal Commission, to consist of not less than three members, "to be "persons of high standing, one of whom should be an eminent "lawyer, and one thoroughly acquainted with the details and prac-"tice of railway management." Now, the whole value of this tribunal will depend upon the character and qualifications of the men selected. The lawyer will be easy to find amongst the seniors of the parliamentary bar. There is Mr. Hope Scott, for instance. But although there are competent men amongst railway managers or engineers who might be inclined to retire to a dignified and well-paid position, there are also accomplished gentlemen, like Captain Tyler and Captain Galton, who might find favour in the eyes of a Government, but would be most objectionable, as amateurs, to the railway interest. Amongst practising engineers, Mr. Hawkshaw's appointment would give confidence to the profession, but we could hardly venture to predict as much of some very famous and very successful vice-presidents of the Institution. But any tribunal would be better than the Board of Trade as at present constituted. The committee, looking on amalgamation and monopoly of railways as inevitable, seek in their recommendation to regulate the monopoly. The following are the more novel recommendations:—

Effectual competition by sea exists, and ought to be guarded, by preventing railway companies from obtaining control over public harbours.

Competition by river and canal exists to a partial and limited extent only, and many and important liuks of canal navigation are in the hands of railway companies, whose interest it often is to depreciate them. It is important that an effort should be made to maintain the competition which now exists; and it is still more important, whether competition is maintained or not, that the capacities of inland navigation should be fully utilized and developed. The following recommendations have this object in view:—

No inland navigation now in the hands of a public trust should be transferred to, or placed under the control of, a railway company.

The utmost facilities should be given for the amalgamation of adjoining canals with one another, or with adjoining inland navigations; and if the trustees of an inland navigation or a canal company apply to Parliament for power to purchase compulsorily a canal from a railway company, such purchase should be favourably regarded by Parliament.

No canal should be transferred to or placed directly or indirectly under the control of any railway company, nor should any temporary lease of any canal to a railway company be renewed until it has been conclusively ascertained that the canals cannot be amalgamated with or worked by adjacent canals, or by a trust owning adjacent inland navigation.

Whenever a railway company applying to Parliament for amalgamation has any canal communication in the district under its ownership or control, the propriety of continuing or modifying such ownership or control should be a subject of investigation by the joint committee referred to below.

The principles of the Railway and Canal Traffic Act should be strictly carried into effect by requiring every company owning or controlling a canal to maintain it in a state of thorough efficiency, to give every facility for through traffic, and to remove every obstacle, whether in the shape of bar tolls or otherwise, which are imposed for the purpose of impeding through traffic; and these obligations should be enforced by proceedings before the commissioners mentioned below.

The owners of any canal or inland navigation should have power to make a through toll or rate from or to any place on its own canal to or from any place on any other canal, or any railway forming a through route; the toll or rate to be divided between the owners of different parts of the route, as a general rule, according to mileage, but with a provision that if any objection be made to the proposed toll or rate or division as unfair, and no agreement can be come to, the commissioners mentioned below shall, upon the application of any of the parties interested, decide the matters in dispute.

As to rates, the committee report that—

Equal mileage rates are inexpedient.

It is impracticable to establish any standard for the revision of rates and fares founded on cost and profit.

There would be much difficulty, and little, if any, gain to the public in determining a maximum scale of "terminal charges."

Immediate reduction of rates and fares, even when practicable, cannot be looked upon as permanently effectual.

Periodical revision of rates and fares is impracticable without some standard of revision.

Revision of rates and fares founded on a limitation of dividend to a fixed amount is undesirable in the interest of the public.

Revision of rates and fares founded on a division of profit above a certain amount between the companies and the public in this country is attended with great, if not insuperable difficulties.

A new and uniform classification of rates is desirable and practicable; and there should be power to alter the classification from time to time, with consent of the commissioners mentioned below.

As to amalgamations, the committee avoid the mistake of Lord Dalhousie's Railway Board, and say—

Whilst on the one hand there may be amalgamations so large as to be objectionable, and while on the other there are cases in which amalgamation is obviously desirable, it is impossible to re-arrange the railway map, or to determine by any general scheme what amalgamations shall be allowed, and what shall not.

As to the extensions, they say—

In the event of branch railways being wanted and being refused by existing companies, power should be given to local authorities to make them, or to guarantee the existing companies a moderate return on the necessary capital, and on such guarantee being given the companies should be bound to make and work the line. If differences should arise between the local authorities and the companies, they should be settled by the said commissioners.

The question of granting running powers to conterminous and often rival railways, they propose to settle by enacting that—

The Railway and Canal Traffic Act ought to be explained by enabling every railway company to make through rates and fares from or to any station on its own line, to or from any station on any other line; the rates to be divided as a general rule according to mileage, after allowing for terminals; but with a provision that if any objection be made to the proposed rate or division as unfair, and no agreement can be come to, the commissioners mentioned below shall, upon the application of any of the companies interested, decide the matters in dispute.

Running powers may usefully be given in certain cases, and the propriety of giving them should be carefully considered by the joint committee hereinafter mentioned. But it is not practicable or desirable to give to railway companies generally running powers over the lines of other companies, or to treat these powers as conditions to be imposed by general legislation. Differences as to running powers, when given, should be settled by the said commissioners.

Altogether, the report, drawn in a moderate tone, will afford plenty of subjects for discussion during the vacation by the railway world.

Circular to Gas Companies.

THE Municipal Corporations (Borough Funds) Bill is now law, thanks to its having been taken up by the Government in the House of Lords, and we may here give a short review of its provisions. In a few words it may be said to give "governing "bodies," under which term every variety of local authority is included, the power to expend public funds in promoting or opposing Bills in Parliament, or in prosecuting or defending legal proceedings in the interest of their districts. Several restrictions, however, are imposed. They cannot promote a Bill to establish gas or water works to compete with statutory companies, and expenses will not be allowed whenever the promotion of, or opposition to, a Bill is decided by a committee of either House of Parliament to be unreasonable and vexatious. The Act not yet being printed, we are uncertain as to the exact wording of clause 3, but the intentions are clear. No expense can be incurred but in pursuance of a resolution of an absolute majority of the whole number of the governing body, carried at a meeting convened by public advertisement, announcing the object of the meeting, after which the resolution is to be twice published in a local newspaper. If the

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promotion of a Bill in Parliament be concerned, the resolution must be confirmed by an absolute majority, as before, at a second meeting of the governing body convened by public advertisement, and held not less than 14 days after the deposit of the Bill. In the meantime, the consent of the Local Government Board or of a Secretary of State must be obtained, and at some time or other, in the course of the proceedings, the consent of owners and ratepayers also. Before the approval of the central authority is given, time is to be allowed for any ratepayer to object to the approval. Further than this, the costs are to be examined by the central authority, who have also power to direct a local inquiry.

Any reader who will turn to the number of our JOURNAL for July 4, 1871, will see how different the Act is from the measure as originally introduced into the House of Commons. The objects are the same, and the Act may be used, as intended, to harass gas and water companies; but the safeguards introduced this session, against the improper use of the powers the Act conferred, are so many and so strict, that in all probability very few governing bodies will venture to avail themselves of the provisions, at all events, to promote Bills. Opposition may be expected in all quarters, and gas and water companies who go to Parliament, or apply for Provisional Orders, will in most cases have to encounter an amount of resistance never before experienced. But a jealous watch kept over the proceedings of the governing body will impose a restraint sufficient to neutralize the exertions of the few agitators who, in the majority of cases, are the real opponents, more to serve their own ends than from any consideration for the public welfare. The ardour of such men will be somewhat cooled by the clause introduced by Lord Redesdale, disallowing the expenses of members of governing bodies who act as counsel or agents in promoting or opposing Bills; but unfortunately there is left the opportunity of acting as witness, and so getting a pleasant holiday in London at the expense of the ratepayers. However, the Bill has passed, and the ratepayers must look to it. We have said all along that it is a ratepayers question. If they will contentedly see the money wrung from them squandered, as this Act will allow it to be, if governing bodies be not watched, it is their affair, and they must pay. Gas and water companies will best protect themselves by keeping their customers alive to this fact. The circumstances at Ryde will no doubt act as a warning to many governing bodies who have been anxious to confiscate gas undertakings, and it must be well understood that compulsory powers of purchase mean purchase by arbitration.

The Public Health Bill has also passed. It is, as we have said, a fragmentary measure, merely intended to constitute local authorities to exercise functions which will be more clearly defined hereafter. It is noteworthy that Earl Kimberley, a member of the Government, in the debate on the Bill above referred to advocated the compulsory purchase of gas and water undertakings by local authorities. It may, therefore, be expected that the next instalment of the Public Health Act will contain clauses giving more extended powers, relating to the supply of gas and water, than were contained in the Bill as originally brought in. There was then a clause giving Local Boards a general authorization to purchase gas undertakings by agreement; but if Lord Kimberley fairly represents the views of the Government, we may anticipate that the next Bill will go a step further, and directly authorize the compulsory purchase. The noble earl seems to suppose that Parliament fixes the compensation to be paid, which he ought to know is never the case except where the Bill confirms an agreement. The next Public Health Bill will require to be watched by gas and water companies.

The metropolitan gas referees have withdrawn the maximum of 30 grains of sulphur fixed upon for the Imperial and South Metropolitan Gas Companies, which was to have come into force on the 1st of October next. This is done on the remonstrance of the companies, who allege that there are no means known of keeping sulphur below this amount except where lime can be freely used. The question, so far as it concerns these companies, is therefore turned over to the new referees to decide. The maximum of 15 grains for Bow and Beckton, from Oct. 1, is retained, and the amount is still kept much below this quantity at these works. The maximum of ammonia at the Pimlico works is fixed at 2½ grains from the 1st of October next.

There would appear to be a chance of the testing-stations in the metropolis falling into some disorganization in consequence of a suspension of the supply of chemicals by the referees. Pending the settlement of the dispute with the Imperial Company on this question, it may not be right to express a confident opinion on this subject, but we may remark that if the testings for impurities are not carried on as usual, the blame will rest with the local authorities.

A special meeting of the Patent Gas Company is called for the purpose of declaring a dividend. It is to be hoped that at this meeting a clearer explanation of the position of the company will be given than has as yet been vouchsafed to the hopeful shareholders. The means of paying the dividend are said to have come from the proceeds of the sale of the American patent. As regards this, a curious shareholder might ask whether or not the patentee did not sell his rights in the United States before the company was formed, and for how much, and whether the company did not buy those rights back again, and for how much. It is now said that the American patent has been sold for £250,000, of which £50,000 has been paid down. What makes the patent of such an enormous value in the United States is hard to see. We may surely now expect some account of the results of the working at East Barnet—how much coal has been used, how much gas has been produced, how much has been expended on works—an answer to which questions would be of great interest to the whole gas world. A shareholder might also ask how much, if any, of the company's money had been expended in support of a foreign gas company which is to use the process, and how many of the English companies alleged to be so anxious to avail themselves of the process have come forward with applications. These, and many other questions, would be suggested by current rumours.

The Town Commissioners of Sheerness and the gas company have come to terms, at all events for a time. A contract has been made for the supply of the public lamps at £4 per lamp for one year, the lamps to be lighted for 326 nights. The minority of the commissioners, who oppose the gas company, do not seem to have renounced the stupid idea of having gas-works of their own.

The accounts of the metropolitan gas companies for the year 1871 have just been issued, and in our next number we shall give the usual abstract and comparative statement.

We continue to receive notices of advances in the price of gas. At Newcastle-on-Tyne and at South Shields a small advance has been made; at Penrith the price has been raised to 5s. 5d., and at Stockton-on-Tees an advance of 4d. and 5d. has been made. At Huntingdon the price has been raised 1s. 6d., and at St. Ives, for public lights, 6d. At Louth the gas for public lights has been advanced 10d. At Prescot and Wakefield an advance of 6d., and at Whitchurch of 10d., has been made. In the Eastern counties the following companies have advanced their price:—Norwich, Cambridge, Ipswich, Lynn, Beccles, Halesworth, Lowestoft, Diss, Halstead, and Long Melford. The advance in prices ranges up to 1s. 8d. per 1000 feet. In Scotland, the price at Lanark has been increased by 1s. 8d., at Campbeltown by 1s. 6d., and at Dunoon 10d. At Forfar, however, the success of the first year's working by the Corporation has been such that the Gas Committee recommend a reduction in price of 10d. per 1000 feet. It must be remembered, however, that the Forfar Gas Act compels the application of surplus profits to reduction of price.

We give, in this number, Dr. Odling's admirable lecture on "Sulphide of Carbon," which will be read with as much interest as it was listened to. For the first time, we believe we may say, is a full and accurate account of this obnoxious body put before the gas world. The practical part of the lecture, at the close, will, of course, be perused with the most attention. Sulphide of carbon is an "acidulous" not a "neutral" body. It combines with alkaline sulphides to form a definite chemical compound, and in a knowledge of the conditions under which this combination takes place most completely lies the secret of the purification of gas from "sulphur." These conditions are now pretty well understood, and great success in purification is obtained. The result follows from applying the principles laid down by Dr. Odling, but the employment of two sets of lime purifiers is hardly necessary. No doubt the use of a second set, as recommended, would effect a more complete purification; but a sufficient degree of purity to satisfy all but the most fastidious can be attained without. So much being gained by the use of lime, the "sulphur question" may be said to be settled up to a certain point, and the question of to-day is, how can lime be freely used in works without creating a nuisance? Surely this is not a difficult question.

To-day we are also able to print a portion of the papers read at the recent meeting of the North British Association of Gas Managers. Two of them will command much attention. The use of shale in the production of gas deserves notice, although it is clear that little or no economy can be expected from its employment. The price of the article will follow the price of coal, and the valueless nature of the residuum in the retort is a great objection to its use. It is easy, however, to see how shale might be employed to advantage with poor coal, if cannel, as it promises, reaches a prohibitory price. There are poor shales in the south of England which might, perhaps, be turned to advantage in this way. The point which will require attention is the regulation of the heats so as to produce permanent gas and not condensable vapours. There is, we believe, no difficulty about this, as we understand that, in experiments made in London, gas produced from shale was found to lose but little illuminating power on standing for some days in the holder.

Correspondence.

THE HYDRAULIC MAIN.

SIR,—A letter in your last issue claims for Mr. Boyd "the credit of being the first to publish the ideas now so successfully carried out in London," in reference to my improvement in the hydraulic main. Mr. Boyd sent me, the other day, a copy of the transactions of the Scottish Society of Arts for 1870, in which his paper appeared—the object of this paper being to give an account of the means adopted by Mr. Boyd for drawing off the tar from the bottom of the main; and, in the concluding paragraph, he says: "An alteration in the shape of the hydraulic main might be made with some advantage." Then he describes the improvement I have effected, the advantage he claims being that it would save "weight on the retort-bench," but he certainly seems to have had no idea of the object I had in view. I have no desire to deprive Mr. Boyd of the credit due to him, but I wish to inform your readers that I had no knowledge whatever of his paper, and in fact, before it was read, I was making experiments, and before the transactions in which it appeared were published, I had the "Livesey Hydraulic" in successful working.

The difference is this: Mr. Boyd, in a paper relating to the hydraulic main, *suggested* something which he said "*might* be an advantage." At about the same time, by a singular coincidence, I, with a definite object—viz., the prevention of an accumulation of thick tar—*adopted* a similar improvement, but waited until I could give the results of two years working on an extensive scale before publication. GEORGE LIVESEY.

South Metropolitan Gaslight and Coke Company,
589, *Old Kent Road, S.E., Aug.* 8, 1872.

Parliamentary Intelligence.

HOUSE OF LORDS.

TUESDAY, JULY 30, 1872.

The MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill was read a first time.

THURSDAY, AUG. 1.

A petition was presented against the MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill, from the Sheffield Water-Works Company.

FRIDAY, AUG. 2.

The KINGSTON-UPON-HULL WATER, &c., Bill was reported, with amendments.

The CHELTENHAM GAS (CONSTRUCTION OF RAILWAY, &c.) Bill was returned from the Commons agreed to, with amendments.

The PUBLIC HEALTH Bill was read a first time.

Petitions were presented against the MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill, from the following gas companies:—British, Barnsley, Wolverhampton, Worcester, Whitby, Ashton, Leamington Priors, Southampton, Nottingham, Blackburn, Cheltenham, Bath, Brighton, Brentford, Brighton and Hove, Bristol, Coventry, Croydon, Derby, Dover, Dudley, Edinburgh, Folkestone, Ipswich, St. Helen's, Richmond, Stratford-upon-Avon, and Preston; and from the following water companies:—Birmingham, Derby, Wakefield, Nottingham, Norwich, and Great Yarmouth.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

On the motion for the second reading,

The Earl of MORLEY rose and said: My lords, the bill which I hold in my hands is not, properly speaking, a Government bill. It was introduced, in the first instance, by the honourable member for York (Mr. Leeman); it passed through a select committee of the House of Commons, and, being thoroughly approved of by the Government, I have been asked to take charge of it. The object of the bill is very simple indeed. It is to allow the governing bodies, as they are called—in municipal towns the Town Council, and in other places the Local Board of Health or the local commissioners—to promote or oppose bills which affect their districts, and to charge the rates which they administer with the expense of so promoting or opposing them. Since the bill has been printed in your lordships House, I observe that a statement has been issued in opposition to the measure; but, my lords, the only point in it to which I need allude is the paragraph which states that the safeguards proposed to be given against an abuse of the power of expending the public money are absolutely illusory. Now, my lords, what are the safeguards which have been inserted in the bill to prevent an abuse of the powers to be conferred upon the governing bodies? But first let me say that your lordships are no doubt aware that up to the present time no municipal body has been able to oppose or promote a bill, and to charge the rates with the expense. They can oppose or promote a bill in which the district they administer is interested; but they can only do it as individual members of the body corporate, and they must take the responsibility and the expense upon themselves. This state of things lasted till the other day, when the case of *The Sheffield Water Company v. The Sheffield Town Council* was tried in the Court of Queen's Bench, the result being that the expense was thrown upon the individual members of the corporation, although in opposing the bill of the company they had acted to the entire satisfaction of the ratepayers, who were almost unanimously in favour of what the council had done. Such being the state of the case, what are the safeguards which the bill provides? In the first place there must be a resolution "of an absolute majority of the whole number of the governing body at a meeting of the governing body, after ten days clear notice by public advertisement of such meeting, and of the purpose thereof, in some local newspaper published or circulating in the district, in addition to the ordinary notices required for summoning such meeting." In the next place the resolution must have the approval of the Local Government Board or of the Secretary of State, according as the matter comes under the jurisdiction of the Local Government Board or the Home Office. Its approval is necessary in case any expense is incurred at all, and that approval is to be given within seven days after the second publication. In addition to all that, the Government department in question will have power to institute a local inquiry. Then there is a provision that "in case of the promotion of a bill in Parliament, no expense shall be incurred or charged as aforesaid after the deposit of the bill, unless the propriety of such promotion shall be confirmed by such absolute majority at a further special meeting to be held in pursuance of a similar notice not less than fourteen days after the deposit of the bill in Parliament." Lastly, there is a proviso "that no governing body of any district containing a population of less than 5000 inhabitants shall take any proceedings under this section without obtaining the consent of the owners and ratepayers of that district, to be expressed by resolution in the manner provided in the Local Government Act (1858) for the adoption of that Act." I believe that this last proviso in clause 3 was introduced at the suggestion of the opponents of the bill; and the larger owners of property will therefore have a greater number of votes than the smaller ones. I cannot conceive, then, what is the meaning of this statement of the opponents of the bill that the safeguards which it provides are simply illusory. I cannot conceive how any safeguards could be stronger. This bill is of very great importance to the large towns of the country. At present, as I have said, however dangerous a bill may be to a district, the parties interested have no power of coming before Parliament and opposing it, neither have they any powers of assisting the passing of a measure, though it may be immensely for the good and the welfare of the inhabitants, in the judgment of their representatives, that it should pass. There are one or two other allegations against the bill. It is said that it comes here at a very late period of the session. But that lateness has been caused by the opponents of a rule which has been lately established in the House of Commons, called "the half-past twelve rule;" and the bill has after all reached us in ample time to be considered. I trust, therefore, that your lordships will give it a second reading. It will introduce a very considerable improvement, and with the safeguards I have named there can be no chance of abuse.

The Marquis of SALISBURY: My lords, I do not dispute the necessity of some such power, but that power, unless very carefully guarded, might be used for purposes of very great oppression. The noble earl has read the third clause, and I will venture to read it again, because I desire to call attention to the slovenly manner in which Acts of Parliament of this kind, introduced by private members, are drawn—"Provided further that no governing body of any district containing a population of less than 5000 inhabitants shall take any proceedings under this section without obtaining the consent of the owners and ratepayers of that district, to be expressed by resolution in the manner provided in the Local Government Act (1858) for the adoption of that Act." Now, what are "the proceedings under this section?" They are that notice by public advertisement must be given, that the resolutions must be twice advertised, and that the approval of Her Majesty's Secretary of State, or of the Local Government Board, must be obtained. Thus the promotion or the opposition to a bill may proceed without any check whatever, for the clause only provides that the proceeding of advertising the bill and obtaining the sanction of the Secretary of State, which are intended for securities, shall not be taken unless the consent of the owners and ratepayers is obtained.

The LORD CHANCELLOR: My lords, it appears to me that the noble marquis is a little hypercritical. I do not think it necessary, however, to argue that point, because if there be any fault in the drawing of the clause it can easily be amended in committee. With regard to the bill itself, it really is one of the utmost importance. It is now some years ago since this question was raised in the Court of Chancery, and that court decided that the borough fund had a strict trust imposed upon it, and that not one farthing of it could be expended for any purpose whatever except those specified by the Municipal Corporations Act. As, therefore, opposition to a bill, however injurious that bill might be to the inhabitants, was not one of the purposes contemplated by the Act, it was impossible for persons—except in their private capacity, and acting in the spirit of patriotism or of citizenship—to oppose any bill except at their private expense. That decision has given ample opportunities to water and gas companies—to railways and other concerns—to override the interests of towns, and to apply to Parliament at their own free will. I apprehend, from the names of the respectable gentlemen which are appended to the paper of reasons against the bill (Messrs. Baxter, Rose, and Norton), that the real opponents are the Sheffield Water Company; and I do trust that your lordships will see the necessity of making provision to enable towns to resist the aggression of companies and to promote useful bills, without compelling private persons to pay the expense out of their own pockets. If the promoters of a bill carry it, they always get their costs, because a clause is always inserted providing for them; but if Parliament should not think it desirable to pass the measure, they incur the risk of having to pay those costs themselves. That is not a state of things which it is right to continue; and with the safeguards in the bill—the consent of an absolute majority of the representative body, the consent of the Secretary of State, and the consent of the ratepayers and owners of property—I do not see how abuse is possible.

Lord REDESDALE: My lords, the best proof that this bill is not wanted is the fact that we have gone on for so long a time without it. We have done without it for the last 30 years; but at last certain people at Sheffield most unwarrantably exposed themselves to the consequences of opposing a bill, and now a measure of this sort is brought forward. I think it is extremely desirable that members of corporations who bring forward or oppose bills should be exposed to the risk of having to pay the costs themselves. Nobody without some experience in such matters can conceive the delight with which members of corporations contemplate the idea of going to Parliament on business of this kind, for it gives them a nice little trip to London; and if the bill passes we shall constantly have them coming to town to amuse themselves at the cost of their fellow-ratepayers. I confess I think the effect of this measure will be to encourage all sorts of speculation on the part of members of corporations. This bill has been brought forward in several forms before, but it has always been rejected, and I think that it is my duty again to oppose it.

The Earl of KIMBERLEY: My lords, I wish merely to make a remark on what fell from the noble marquis respecting clause 3. Clause 3 is not well drawn; but I apprehend that the proviso applies to the whole clause. No expense can be incurred except in pursuance of a resolution of a majority of the governing body, and that resolution cannot be passed without the consent of the owners and ratepayers. The owners and ratepayers have, therefore, the power to vote against the whole thing. I will only add one word as to the merits of the bill. I think it is a very great misfortune that those bodies which have charge of the local government throughout the country have not had powers similar to what are proposed to be given them by this bill. If they had had them, it would have prevented a great many bills from being carried, and would thus have done one of the most useful public services that could be performed. It must surely be most beneficial that there should be a public body with power to watch over the interests of the borough; and, on the other hand, the precautions are such that no job can be perpetrated.

After a few words from Viscount MELVILLE, who was inaudible in the gallery,

The bill was read a second time.

MONDAY, AUG. 5.

CHELTENHAM GAS (CONSTRUCTION OF RAILWAY, &c.) BILL.—The Commons amendments were considered, and agreed to.

A petition was presented against the MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill, from the Liverpool Gas Company.

The PUBLIC HEALTH Bill was read a second time.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

On the motion for committing the bill,

Lord REDESDALE suggested that words should be introduced to prevent the compulsory purchase of existing companies; and that no member of a governing body should be allowed his expenses in promoting or opposing a bill.

Their lordships then went into committee, and

The Earl of MORLEY proposed a slightly varied form of clause 3 to meet the Marquis of Salisbury's objection.

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This was agreed to.

The Earl of LONGFORD said the bill was an essentially English one, but in order to prevent any dispute he would move that the last clause should run thus: "This Act shall not extend or apply to Ireland or to the City of London or the metropolitan area, as defined by the 'Metropolis Local Management Act, 1855.'"—Agreed to.

The Marquis of SALISBURY suggested that Scotland should also be excluded.

The Earl of MORLEY said there was a desire on the part of Scotland to be included in the bill, whereas the feeling in Ireland was directly the contrary.

The bill then passed through committee.

TUESDAY, AUG. 6.

The following Bills received the Royal Assent:—BRIGHTON AND LONDON SEA WATER SUPPLY, and CHELTENHAM GAS (CONSTRUCTION OF RAILWAY, &c.).

The KINGSTON-UPON-HULL WATER, &c., Bill was read a third time, with the amendments, passed, and sent to the Commons.

The PUBLIC HEALTH Bill was reported.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) BILL.

The report of amendments having been received,

Lord REDESDALE proposed words to prevent the powers of the bill from being applied to the compulsory purchase of the undertaking of any company.

The Earl of MORLEY: I regret to say that I cannot accept an amendment which would render the bill almost useless. The fact of the matter is that the bodies which have now the responsibility of the public health in different towns have no power over the companies except that of compulsory purchase; and the safeguards which are provided are quite sufficient to protect the companies in the matter of terms. With regard to the general question of the purchase of gas and water works by public bodies, I would remind your lordships of the recommendation of the commissioners who sat on the subject of gas and water bills—namely, that the levying and expenditure of public rates for gas and water should be in the hands of responsible public bodies, and that consequently there should be a power of purchasing existing companies. I venture to think that if your lordships took away this power you would reduce the bill to absurdly small proportions.

Lord REDESDALE: My object is to prevent corporations from having the power of taking other persons' property against their will. The whole origin of this bill is the Sheffield case. They brought in a bill for the compulsory purchase of the water-works. They were resisted, and their bill was thrown out; and it is most unjust that they should repeat the attempt. The power will be an utterly vexatious one.

The Earl of KIMBERLEY: I think that nothing is more unfortunate than that these companies should be in possession of the various water and gas arrangements of towns; and I think it most desirable to give to governing bodies a compulsory power of purchase. In every case Parliament will have to be applied to, and it will see that full compensation is given.

The amendment was then withdrawn.

The Marquis of SALISBURY moved the following proviso after clause 2: "Provided that no powers contained in this clause shall apply in any case where the promotion of, or opposition to, a bill by a governing body has been decided by a committee of either House of Parliament to be frivolous and vexatious."—Agreed to.

Lord REDESDALE moved the following new clause: "No expense incurred by a member of a governing body on account of attendance on Parliament in promoting or opposing any bill, nor any payment to any such member for acting as counsel or agent in promoting or opposing any such bill, shall be charged as aforesaid." The noble lord repeated that his object was to prevent members of governing bodies from getting up bills or oppositions for the sake of a trip of three or four days to London at the expense of the ratepayers.

The Earl of MORLEY: I really cannot think the noble lord can be serious in proposing the first part of his clause. It is quite clear that under the provisions of the bill no proceeding can be taken without the consent of the ratepayers and of the Secretary of State or the President of the Local Government Board. To put this restriction on members of the governing bodies is, therefore, quite out of the question. With regard to the second part of the proposal, I have no objection to that.

The Marquis of SALISBURY begged to suggest the addition of the words, "or brother or son of the same."

The second part of the clause was then agreed to in the following form:—"The expenses of no member of such governing body, and acting as counsel or agent in promoting or opposing any such bill, shall be charged as aforesaid."

Lord REDESDALE moved to substitute, in clause 3, "a majority of two-thirds," for "an absolute majority."

The Earl of MORLEY: I regret, for the reason we have so often urged, that I cannot accept the amendment. I do not know if I am out of order in making such a statement; but in the select committee the proposal was made by the noble lord, and it was negatived without a division. I do not think there is any danger of a job being perpetrated by the Town Council or governing body.

The amendment was negatived.

WEDNESDAY, AUG. 7.

The PUBLIC HEALTH Bill was read a third time, amendments made, Bill passed, and sent to the Commons.

MUNICIPAL CORPORATION (BOROUGH FUNDS) BILL.

The Bill having been read a third time,

The Earl of MORLEY suggested that, for the sake of uniformity, the phrase in Lord Salisbury's clause should be altered to "unreasonable and vexatious."

This was agreed to, and the Bill passed.

THURSDAY, AUG. 8.

The BARNET DISTRICT GAS AND WATER Bill was returned from the Commons, with amendments; the said amendments considered, and agreed to.

The MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill was returned from the Commons, with the amendments agreed to.

FRIDAY, AUG. 9.

The KINGSTON-UPON-HULL WATER, &c., Bill was returned from the Commons, with the amendments agreed to.

SATURDAY, AUG. 10.

The following Bills received the Royal Assent:—PUBLIC HEALTH. MUNICIPAL CORPORATION (BOROUGH FUNDS), BARNET DISTRICT GAS AND WATER, KINGSTON-UPON-HULL, &c.

HOUSE OF COMMONS.

MONDAY JULY 29, 1872.

The CHELTENHAM GAS (CONSTRUCTION OF RAILWAY, &c.) Bill, as amended, was considered.

The MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill was read a third time, and passed.

WEDNESDAY, JULY 31.

THE BARNET DISTRICT GAS AND WATER Bill was reported, with amendments.

THURSDAY, AUG. 1.

The CHELTENHAM GAS (CONSTRUCTION OF RAILWAY, &c.) Bill was read the third time, and passed, with amendments.

FRIDAY, AUG. 2.

The PUBLIC HEALTH Bill was read the third time, verbal amendments made, and the bill passed.

MONDAY, AUG. 5.

The BARNET DISTRICT GAS AND WATER Bill, as amended, was considered.

TUESDAY, AUG. 6.

METROPOLITAN WATER SUPPLY.

Mr. KAY-SHUTTLEWORTH asked the President of the Board of Trade what progress had been made in the inquiry (instigated by the Board of Trade) under section 22 of the Metropolis Water Acts, 1871, in relation to the regulations proposed by the London water companies, and how soon that inquiry may be expected to terminate.

Mr. C. FORTESCUE said he was able to give his honourable friend a satisfactory account of the progress of the inquiry. The committee appointed by the Board of Trade had had before them the several matters connected with the supply of water to the metropolis; the companies had been heard by counsel in support of their regulations, and the Metropolitan Board of Works had also been heard by counsel; and there were certain other matters which were taken separately. The result was that, with the exception of two, the regulations had been settled, and the committee had adjourned to Thursday to enable the parties, if possible, to come to a settlement. As soon as possible after he had received the report of the committee the regulations would be sanctioned.

WEDNESDAY, AUG. 7.

The PUBLIC HEALTH Bill, and MUNICIPAL CORPORATIONS (BOROUGH FUNDS) Bill.—The Lords amendments were considered, and agreed to.

THURSDAY, AUG. 8.

The BARNET DISTRICT GAS AND WATER Bill was read a third time, and passed, with amendments.

THE METROPOLIS WATER COMPANIES.

Colonel BERESFORD gave notice of his intention next session to call attention to the water supply of the metropolis, and the works and privileges of the various water companies, with a view of consolidating such works, and enabling the local authorities to purchase them, and ensuring a constant supply of water.

Mr. KAY-SHUTTLEWORTH asked the President of the Local Government Board what steps he has taken regarding the report by Mr. Netten Radcliffe (Parliamentary Paper, No. 362) on a nuisance from a dust-yard adjoining the open reservoirs and filter-beds of the Southwark and Vauxhall Water Company, and leased by "one of the contractors engaged in the removal of the dry, house, and other refuse, and of the stable manure from part of the parish of St. George's, Hanover Square, for the purpose of deposit of this refuse, and of sifting such portions of it as are usually submitted to that process, previous to the refuse being placed in barges for carriage from the metropolis;" how it has happened that, although this report is dated the 25th of April, Mr. Netten Radcliffe had to report on the 3rd of July that this nuisance still existed, that on that day it caused a most offensive stench at a distance of 80 yards from the dust-yard, and that "the accumulation of 'dust' and of stable manure was greater than at the time of his visit on the 22nd of April, and that the yard was altogether in a fouler state;" whether the promised measures were taken in April by the Wandsworth Board of Works "to obtain an abatement and prevent a recurrence of the nuisance;" whether the vestry of St. George's, Hanover Square, has taken any action; and, whether "the indifference of the water company to the nuisance" still continues?

Mr. STANSFELD said on the receipt of Mr. Radcliffe's report the Local Government Board communicated with the District Board of Works and the vestry of St. George's, Hanover Square, and copies of the report were also sent to the Board of Trade. On the 2nd of July, after the second application, the district board informed the Local Government Board that delay had arisen. On the 9th of July the case was heard before the magistrates, Mr. Radcliffe appearing as a witness, but the case was dismissed on the ground that the accumulation of deposits had not lain longer than was necessary for the purpose of manufacture, and that every available means had been taken for the protection of the public, and the board had not since received any communication from the vestry of St. George's, Hanover Square, on the subject. With regard to the purity of the water, it was not in any way affected by the vicinity of the deposits in question. He understood that they made application to take proceedings, but the district board having prosecuted, and having failed, the Board of Trade had no power.

Mr. KAY-SHUTTLEWORTH then asked the President of the Board of Trade whether his attention was called to the report of Mr. Netten Radcliffe, in April, in which he described a nuisance "offensively compromising the water supply" given by the Southwark and Vauxhall Company; whether he was aware that on the 3rd of July Mr. Netten Radcliffe further reported of the screen then in process of construction, to be placed between the dust-yard and the water-works, "It is not probable that a screen of this altitude (10 to 12 feet) will perceptibly diminish the nuisance from the 'dust-yard' as affecting the water company's works;" and if he would state to the House what communications he had addressed to the water company on this subject?

Mr. CHICHESTER FORTESCUE said his contribution to this history was as follows:—The report of the 24th of May was sent by the Local Government Board to the Board of Trade, and the Board of Trade forwarded a copy of it to the Vauxhall and Southwark Water Company and requested an explanation. The company replied that the Wandsworth Board of Works had informed them that in regard to the nuisance complained of they had ordered the requisite proceedings to be taken for its removal, and he believed the water company were very anxious to get the Wandsworth Board to remove it. They added that in their belief the purity of their water was not in any way affected, and that action should be taken not by the company, but by the local authorities. A copy of that reply was transmitted to the Local Government Board, and the Board of Trade had heard nothing of the matter since.

FRIDAY, AUG. 9.

The KINGSTON-UPON-HULL WATER, &c., Bill.—The Lords amendments were agreed to.

WATER SUPPLY OF KETTERING.—Owing to the discovery of an additional spring during the sinking at Weekley by the water-works company, the supply available for Kettering has been increased to 400 gallons per minute, or 576,000 gallons in 24 hours. This is a quantity sufficient for a town three times as large as Kettering, allowing 25 gallons per head daily. The works are being rapidly proceeded with.

Legal Intelligence.

ROLLS COURT.—Fridays, July 12 and 26.
(*Before the* Master of the Rolls.)

NORTH STAFFORDSHIRE RAILWAY COMPANY *v.* THE TUNSTALL LOCAL BOARD OF HEALTH.

Mr. Bristowe, Q.C., appeared for the plaintiffs; and Mr. Southgate, Q.C., for the defendants.

Mr. Bristowe said this was a complaint of the obstruction or pollution of a canal by the Tunstall Board of Health. A bill had been filed by the plaintiffs, calling on the defendants to take steps for stopping the pollution, and he assumed that they had done all they could in the time; but the fact was that the works were not yet completed.

Mr. Southgate said that the answer was, that on Sunday, the 7th of July, a tremendous storm blew up part of the works and prevented their completion. At the same time there was no great flow of sewage into the canal.

Mr. Bristowe said he had an affidavit, setting forth that the sewage was still flowing into the canal. There was also an affidavit made by the company's surveyor, stating that the works had been damaged by the storm, and that the whole of the sewage flowed into the canal.

Mr. Southgate observed that the new works would be replaced.

His Lordship suggested that they might burst again.

Mr. Bristowe said that the plaintiffs said the works were not completed, and that defendants said they were. He proposed that his lordship should appoint some eminent engineer to go down and inspect the works, and report to his lordship. This would be the best course to pursue between two public bodies. If the works were completed they must be such as would carry the sewage underneath the canal. That would satisfy the plaintiffs. There was also a subsidiary question, whether the defendants had taken a stream which acted as a "feeder" to the canal, but which the defendants called a ditch. That ought to be inquired into, and if substantiated, the plaintiffs claimed damages for it. The company used to have four lochs of water filled daily from this feeder, and the damage arising from its conversion was very considerable, as it was at the culminating or raised point of the district.

In reply to his lordship, Mr. Bristowe admitted that the canal traffic was not so great now as it was formerly.

His Lordship thought those damages should not be pressed at present, and the parties might settle the other matter.

Mr. Southgate read an affidavit, setting forth that the extraordinary and exceptional storm of the 7th of July had blown out the works at the junction or outfall between the old and the new sewers, and it was found that it did not go into the canal at all.

His Lordship thought that the plaintiffs might trust to the defendants making good the damage.

Mr. Bristowe said the plaintiffs had been put off from time to time about the construction of this sewer. He submitted that the plaintiffs evidence was distinct.

His Lordship remarked that the other evidence was also distinct, and there was no answer to it.

Mr. Bristowe suggested that it should stand over for a week.

In reply to his lordship, Mr. Southgate said that about 15 yards of the sewer were blown out. He was informed that the cement had not set when the storm came.

His Lordship said the case had better stand over for a short time, and then they could assume that the works were completed, or that they were not. They might take a fortnight for the cement to set.

The case accordingly stood over until the 26th ult., when Mr. Southgate, Q.C., who appeared for the defendants in this case, said he had seen his friend, Mr. Bristowe, who represented the other side, and he could inform his lordship that the plaintiffs were satisfied that that which the defendants had undertaken to do had been carried out.

The Master of the Rolls inquired whether the recent storms had interfered with their work.

Mr. Southgate said they had not at present, although it was impossible to say what they might do. At all events, Mr. Bristowe was satisfied. He believed no order had been drawn up in the case, but there was an injunction granted by Vice-Chancellor James in an early stage of the case. It was simply to restrain them from opening any new drain into the watercourse. They no longer interfered with the canal works, and therefore there was no objection to their opening new drains. With his lordship's permission, he would, therefore, take an order in these terms:—"That the plaintiffs being now satisfied with the work done by the defendants, the order for the injunction made by Vice-Chancellor James be discharged, and that the case be heard in Michaelmas term next."

The Master of the Rolls gave his consent to the order.

VICE-CHANCELLOR'S COURT.—Monday, July 29.
(*Before Vice-Chancellor Sir* R. Malins.)

BARDWELL *v.* SHEFFIELD WATER-WORKS COMPANY.

This was a case of considerable interest to all shareholders in companies engaged in constructing important works. The company in question were the proprietors of the Dale Dike Reservoir, the bursting of which, in 1864, occasioned the disastrous inundation of that year, by which damage was done in or near Sheffield to the extent of £364,000, which sum had been paid to the sufferers by the company.

Mr. Bagshawe appeared for the plaintiff, who represented the ordinary shareholders; Mr. Robinson for the preference shareholders; and Mr. Charles Hall for the company and the directors.

Mr. Bagshawe said this was a special case stated for the opinion of the court. The question was whether the fortnightly payments made by the water company in providing new reservoirs should be paid out of capital or income. He contended that it ought to be paid out of capital.

Mr. Charles Hall said the directors were willing, if they were not precluded by the 121st section of the Companies Clauses Consolidation Act, 1845, which stated that "the company shall not make any dividend whereby their capital stock shall be in any degree reduced."

Mr. Robinson, on behalf of the preference shareholders, objected to the payment out of capital, arguing that the above clause precluded the payment.

The Vice-Chancellor, after referring to the inundation of 1864, rendering necessary the construction of new and additional reservoirs, said: This work, being one of a very peculiar character, and requiring great care, the company determined to construct the reservoirs themselves instead of entrusting them to a contractor in the usual manner. The work had already occupied seven years, and, in order to provide the ready money required during its progress, the company had been compelled to borrow large sums, and to pay interest upon them. The present question was, in fact, whether the money thus paid in respect of interest was, as between the different classes of shareholders, to be paid out of capital, or, by reduction of dividends, out of income. Now, if the works had been constructed by a contractor in the usual way, he would have been paid by stated sums at deferred periods, and these sums would, of course, have been charged to capital; but the contractor, in making his calculations, would have taken into account interest on the money advanced by him during the progress of the works, and would have been paid accordingly, so that, in effect, the interest would in this, the ordinary case, have been paid out of capital. His Honour was of opinion that the company, who were doing the work themselves, were entitled to stand in the same position as a contractor would have done, and that, considering that the works had occupied seven years, interest paid in the meantime was properly chargeable to capital, and he decided accordingly.

Friday, August 2.

BIRMINGHAM AND STAFFORDSHIRE GASLIGHT COMPANY *v.* BATSON.

Mr. Cotton, Q.C. (with him Mr. Speed), said he had to ask for an injunction to restrain the defendant, who owned a colliery on the Dudley Road, near Birmingham, from working the mines or excavating the earth so as to deprive the plaintiffs of rights which they enjoyed, and from doing injury to buildings and mains belonging to them.

Mr. Woodrop, who appeared for defendant, said he was ready to give the undertaking except as to the mains. Some of them had only been put in a short time. With that exception he would give the undertaking until the second motion day in Michaelmas term.

Mr. Cotton said it must not be supposed that there was any doubt as to their rights with regard to the mains.

After the lapse of a short time Mr. Woodrop re-entered, and said he found that the notice of motion referred to buildings. Now there was a Wesleyan chapel erected on a portion of the land.

Mr. Cotton observed that the defendant wanted permission to knock down a Wesleyan chapel.

The Vice-Chancellor (to Mr. Batson): Do you intend to let it down?

Mr. Woodrop said no, but they objected to acknowledge their right to support the chapel. It had been built within twenty years.

The Vice-Chancellor: Well, you say you do not want to let the chapel down. I cannot re-open the matter; you have given the undertaking, and I have recorded it.

Mr. Woodrop said he could not give such an undertaking.

The Vice-Chancellor: The undertaking shall stand as it is given. You deliberately gave it, and it shall stand. You have no right to let the Wesleyan chapel down, and you shall not.

MIDDLESEX SESSIONS.—Wednesday, Aug. 7.
(*Before Serjeant* Cox.)

ROBBERY FROM THE IMPERIAL GASLIGHT COMPANY.

Francis Clayton, 42, a clerk, who pleaded guilty on Tuesday to embezzling a sum exceeding £300, the property of his employers, the Imperial Gaslight and Coke Company, was again brought up.

Mr. Willoughby prosecuted; Mr. Besley (instructed by Mr. Ricketts) defended.

Mr. Willoughby stated the facts of the case, as reported in our last number, and said that, under the circumstances, the company could not recommend the prisoner to mercy, but they did not press the charge, and would leave it in the hands of the court.

Mr. Besley, in mitigation of punishment, stated that the prisoner had a wife and seven children, between the ages of twelve and one, and sickness in the family had entailed heavy expenses upon them. A friend lent £300 without interest, and instead of disclosing his circumstances the prisoner repaid the loan in March, and used the company's money to do so. He was in hopes that the cheque which he paid in would be met, and when he was disappointed, and knew discovery was inevitable, he left home and wandered about for some days contemplating suicide. He was an insurer in the European Life Assurance Company, and paid £400 in premiums, but the policy became worthless. He had also paid to the company's guarantee fund, and therefore the gas company would not lose one farthing by the prisoner's misconduct. But besides any punishment from the court, the prisoner would lose all claim to a retiring pension, which would have been given on the completion of three years' more service.

Serjeant Cox said the court admitted that in this case there were circumstances of mitigation, and consequently the sentence, which would otherwise have been for eighteen months, would be one-half—viz., imprisonment for nine months.

SURREY ASSIZES.—Guildford, Thursday, Aug. 1.
(*Before Baron* Martin *and a Special Jury.*)

STEVENSON *v.* THE MAYOR, ETC., OF RYDE.

Mr. Philbrick and Mr. Horace Brown appeared for the plaintiff; Serjeant Parry and Mr. Joyce for the defendants.

This was an action for professional services rendered by the plaintiff to the defendants in the course of the proceedings connected with the recent gas-works arbitration at Ryde.

Mr. Philbrick, in stating the case, said the plaintiff claimed the sum of £657 4s. 3d., less £100, which he had received on account for services rendered by him as a civil engineer in connexion with the transfer to the corporation, as the local board, of the undertaking of the Ryde Gas Company. The gas-works at Ryde had been for some years carried on by a company, and it being deemed expedient by the local board that those works should be under their control and management, and that they should supply gas to the district, they resolved in the year 1871 to give notice to the company (as they had power to do under an Act of Parliament passed in 1865) to treat with them for the purchase of their property. But in order that they might be enabled to purchase the undertaking on behalf of their constituents it was necessary that they should obtain professional advice as to the position of the works, the amount of profit which was realized from them, the probable chances of extending the supply of gas, and, in short, that they should have a thorough investigation into the affairs of the company. Mr. Stevenson was an associate of the Institution of Civil Engineers, a gentleman of great eminence in his profession, and he had devoted a large amount of attention to questions connected with the manufacture and supply of gas. The Town Council having resolved upon the purchase of the Ryde works, sent up a deputation to Mr. Stevenson, and, as he was an utter stranger to them, they produced a letter of introduction, and informed him of the object of their visit. Mr. Wallis, a member of the deputation, asked what his terms would be for advising the corporation in the matter, and Mr. Stevenson then and there, having a book before him, took up that book, which contained entries against other corporations, and said, "Here are accounts in other cases similar to that about which you have now come to consult me; you will see from these what my charges are;" whereupon Mr. Alderman Dashwood said, "Never mind about that; Mr. Stevenson will charge us what is usual." Mr. Stevenson, having been retained on behalf of the corporation, proceeded to do that which was required of him, and it was not to be supposed there was the slightest doubt that he did not do the whole of the work charged for. This included a journey to Ryde to examine the works and the accounts of the gas company, and the necessity for making a large number of calculations—very intricate calculations—requiring not only a considerable amount of scientific knowledge on his part, but also the services of a professional accountant to work out. These tables and calculations had to be lithographed, after having been checked and verified, and, when the whole were complete and the conclusions arrived at, the result was communicated to the defendants in the form of a report as to the value which Mr. Stevenson put upon the works. In the meantime the company had sent in their claim, which amounted to between £60,000 and £70,000. The amount of Mr. Stevenson's valuation was between £36,000 and £37,000, but this did not allow anything for certain land and other matters not falling within his purview, which increased the total value to between £42,000 and £43,000. Accordingly, the parties not agreeing, and there being this

difference between them, they proceeded to take that which, as was probably known by the jury, as the regular course, where the Lands Clauses Consolidation Act was incorporated with the special Act of Parliament giving power to take works—they proceeded to arbitration. On behalf of the corporation, Mr. Charles Cawley, M.P. for Salford, was appointed arbitrator, and Mr. T. Hawksley acted in that capacity for the gas company, and these two gentlemen selected as their umpire Mr. Henry Arthur Hunt to finally decide the matter in case they should disagree. The arbitration was commenced in December last, and the investigation extended over six days. Very eminent counsel were employed on each side, and after hearing all that could be said in support of the respective views of the parties, there having been a great array of scientific and local evidence, the two arbitrators failed to come to an agreement, and in February of the present year the umpire was called upon to decide the point. He accordingly made his award, and gave as the sum which, in his judgment, should be paid for the whole undertaking, £58,443—not quite what the gas company asked, and not what the corporation had been willing to pay. However, the court had nothing now to do in inquiring into the award. Mr. Stevenson, he should mention, had during the progress of the case received £100 from the corporation, and on the 2nd of February he wrote to the town-clerk asking for a further payment. On the 13th the town-clerk replied, stating that before paying any more money the local board desired to have a statement of the plaintiff's charges in detail. Thereupon Mr. Stevenson sent in his bill, and hearing no more of the matter he wrote a letter on the 8th of April, in which he said, "I think I am entitled to ask for substantial payment on account of services rendered." On the 11th of April the town-clerk replied, "If it rested with me, both you and I would have received our costs in this matter long ago." This letter raised no word of objection to the charges in the plaintiff's account. Further correspondence followed, and how, in the face of these letters, the corporation could now come before the jury to dispute the plaintiff's claim he (Mr. Philbrick) confessed he was unable to understand. Matters went on without any satisfactory result until legal proceedings were commenced. No sooner had the writ been issued than a long letter came from the local board, in which they stated that they were not in a condition to meet the claim, and expressing surprise at the amount of the plaintiff's bill. This letter contained the first suggestion of anything like dissatisfaction. The local board had had the account in their possession four months; they had promised payment, and then, when they find the plaintiff is determined to press for a settlement by legal means, they set up this defence. It could only be explained on the well-known principle that corporations would frequently in their corporate capacity do things which the individual members of these corporations would shrink from attempting. Mr. Stevenson offered that if the Ryde Local Board would 'give him judgment he would let payment stand over as long as he could, but instead of doing so they resolved to defend the action and set up a plea of never indebted, and that they did not owe the plaintiff a farthing. When the cause was ripe for trial the local board amended their pleas, and paid £412 into court, which included payment for everything Mr. Stephenson claimed except for his own personal services per diem. By some mysterious process they cut down the charges of the plaintiff for personal services from ten guineas a day to seven guineas, and that which they had taken off was the amount now in dispute. The charge of ten guineas a day was in Mr. Stevenson's book when he offered to put it into the hands of Mr. Wallis, and ten guineas a day was the plaintiff's usual charge. When people secured first-rate services they must expect to pay for what those services were worth. Mr. Spice, a gentleman employed in a similar capacity on the other side upon the arbitration was paid precisely at the same rate, and there were gas engineers of eminence in the court who would prove that this was a fair, proper, and usual charge. When the jury had heard the evidence of these witnesses, he (Mr. Philbrick) made no doubt they would say that the plaintiff was entitled to their verdict. The defendants had been trying to refer this matter by saying that it was a mere question of account; but he thought the jury would say that which he ventured to assert, notwithstanding Serjeant Parry appeared against him—viz., that this was virtually an undefended action.

Mr. *George Wilson Stevenson*, examined by Mr. BROWN.

I am the plaintiff in this case. I am a civil engineer, carrying on business in Great George Street, Westminster. I have had 25 years experience in my profession. In the course of that experience I have devoted my attention very largely to questions connected with gas and water works—they have been my speciality. In the course of last year I was waited upon by a deputation from the local board of Ryde—that was on the 26th of April, 1871. Among the deputation were Alderman Dashwood and Councillors Wallis and Colenut. They told me that they were about to purchase the gas-works at Ryde from the company, and were looking out for an engineer to advise them as to the value of the undertaking. They said they had been recommended to come to me, and they inquired my experience in such matters. I told them for what corporations and companies I had been concerned in conducting similar proceedings, and then Mr. Wallis asked what my terms were. I told him I could not say what the charge would be, as it would depend upon the length of time the inquiry would occupy; and I was about to take my book of account out of a drawer, and hand it to him, when Alderman Dashwood said, "We will not trouble him about the matter; he will charge what is usual and proper." They left me and went about the country. They went to York and Peterborough, and some other places, where I have been engaged, and made inquiries, and finally went home to Ryde, and reported to the corporation, recommending that I should be appointed; and I was appointed.

Baron MARTIN: What were you appointed for?

Witness: To make a valuation of the gas-works. The appointment is under seal, I believe.

Serjeant PARRY: There is no dispute as to the appointment.

Mr. BROWN: How long, from first to last, were you acting under that appointment for the corporation?

Witness: Nearly a year, off and on. I was occupied 46½ days—not in making the valuation. This is a copy of my account. I had to employ an accountant. The valuation of itself would not occupy very long. My valuation, amounting to £36,000, was never made known to the company, under the advice of the solicitors, and they went to arbitration under the Lands Clauses Act. I acted for the corporation all the way through, in getting up the evidence and supporting witnesses. I believe the corporation relied upon me in the conduct of the case.

Serjeant PARRY: Do not say what you believe.

Witness: I am certain they relied upon me in the conduct of the case.

Serjeant PARRY: I object to this gentleman stating that the defendants relied upon him for anything. The nature of the appointment will be seen.

Mr. BROWN: What was the nature of the work you did for them as to getting out the accounts and the evidence.

Witness: My account gives all the particulars. I furnished the defendants with a copy of this account on the 19th of February. It shows what I did for them day by day.

Baron MARTIN: Are the charges the usual charges?

Witness: They are the charges I always make, and which all the engineers I know, at all events of my standing in the profession, do make. I do not know any one who charges less, nor any one who charges more. Ten guineas a day has been my charge in other matters of the same kind. I charged the same to the Corporations of London, York, Dublin, and Dundee.

Baron MARTIN: Did the Scotch people pay you well?

Witness: They paid me 500 guineas. I have always charged and been paid 10 guineas a day.

Examination continued: The reference took place in December last, and I was engaged seven days before the arbitrators. I had to get up all the evidence for the witnesses—lithographed copies of my own figures, copies of the analysis of the company's accounts for four years—and to supply them with all the documents to enable them to form an accurate opinion of the value of the undertaking without themselves going into it *ab initio*. Whatever I have paid is set out in full. I paid the expenses of men from the country. I have received £100 on account in addition to the sum paid into court, and I now claim £145 2s. 6d. I wrote and received the letters now put in. I did not wish to press the corporation for the money; I wished to make the payment suitable to their convenience. I simply wanted a legal judgment in the matter.

Cross-examined by Serjeant PARRY: My valuation of these works was £36,287. The claim of the company was £61,925. My valuation did not include the land beyond the curtilage of the works, which, I think, was valued at £5000; but I do not quite remember, as I had nothing to do with it individually. The amount of the umpire's award was £58,443. It did not take me 46½ days to value the gas-works. I am not sure I could give you the exact number of days which that occupied. I went to Ryde on the 4th of May, and made my report on the 19th of May, but it was not sent in until the 9th of June. I cannot say how many days I was valuing the works, because in addition to that I was getting up information with a view to the further conduct of the case. Between the time I was retained and the time I sent in my report I was engaged 9¾ days. It requires a considerable amount of engineering knowledge to make a valuation of gas-works, and that knowledge I brought to bear upon this valuation before I made my report.

Serjeant PARRY: Do you charge 10 guineas a day for other services besides the valuation, because your appointment is to value on behalf of the local board?

Witness: Yes.

Serjeant PARRY: What are the other services?

Witness: They are all set forth in this account.

Cross-examination continued: I charge 10 guineas a day for being a witness on the arbitration. I charge 10 guineas a day for all the time I was actually employed on the business of the Ryde Corporation. I charge for an accountant 64¾ days at one guinea a day. He was a clerk in my employ. I have not paid him that; I have paid him half a guinea a day. I charge for a clerk 23½ days at half a guinea. I did not pay him quite so much as that. There is a journey to Ryde to meet the committee; I charge half a day for that. The 46½ days are made up of days and fractions of days. Office hours are from 10 to 5, and we take half an hour for luncheon. The sittings before the arbitrators were from 11 to 4. I attended Mr. Cawley at the House of Commons, and half a day is charged for that. I had to hang about the House of Commons for a long time, and it was a most wearying and wretched business. I charge 10 guineas a day for all the time actually employed in and about this business. There were a number of hours and half hours that I have made no charge for, and I have not charged for over 180 letters that I wrote. Mr. Cleminshaw was the next supporting witness to me, and I have an entry for attending him. I have an entry for attending Mr. Gale as to counsel going down to view the works. I am sure the arbitration lasted seven days. I have not charged for Sundays. If I have done so it is a clerical error. I charge one guinea for expenses when I have been out of town on Sunday.

Serjeant PARRY: I find, on referring to the almanac, that one of the days for which you make a charge was the second Sunday after Trinity. Perhaps that will bring it to your attention.

Witness: If there is any charge made for a Sunday it is a clerical error.

Serjeant PARRY: Have you brought your diary with you here?

Witness: No.

Serjeant PARRY: You have had notice to produce it.

Witness: I decline to produce it, as it has entries relating to other clients.

Re-examined by Mr. PHILBRICK: The accounts of the gas company had to be investigated down to the latest period, and they were very voluminous. There were very many and very laborious calculations to be made. I had to work upon the last year, which was the material year for the purpose of the reference, and upon which the umpire chiefly proceeded. I still say that 10 guineas a day is a fair and regular charge.

Baron MARTIN: I understand that charge was contained in a book which you offered to show the gentlemen who came to you as a deputation?

Witness: Yes; and which I offer now to show the jury, if they wish to see it. The corporation expressed themselves satisfied with my charges; they never objected to my account, though they had had it for three months.

Mr. *A. Penny*, examined by Mr. PHILBRICK.

I am an associate of the Institution of Civil Engineers, and have had 25 years experience in the profession, having specially directed my attention to questions connected with the supply of gas and water. I have known Mr. Stevenson for 10 or 12 years; he is in the front rank of the profession. I have met him in most of the important cases of the day. There are few cases of this kind in which he is not engaged on the one side or the other.

Mr. PHILBRICK: He has told us that he charges at the rate of 10 guineas a day. What do you say to that?

Witness: I say that for a man in his position 10 guineas a day is a perfectly recognized charge.

Examination continued: I was a witness in this case, and engaged on the other side—for the gas company—and my charge was 10 guineas a day.

Cross-examined by Serjeant PARRY: My valuation was somewhere about £60,000. In such matters as these a charge ought to be made for whatever is done. I have been paid 10 guineas a day for hanging about the House of Commons, and very distasteful work that is.

Mr. *George Garnett*, examined by Mr. BROWN.

I am secretary to the Ryde Gas Company. Mr. Spice was engaged by us in connexion with this matter in the same capacity as Mr. Stevenson. Mr. Spice's charges were 10 guineas a day, and he has been paid £650 on account of about £760.

Mr. BROWN: In your experience, are these charges that Mr. Stevenson has made the usual charges?

Witness: Yes; for that description of work I know they are.

Cross-examined by Serjeant PARRY: Whatever he may be engaged on, whether it is merely walking backwards or forwards, or going to the House of Commons, he is still entitled to charge 10 guineas a day.

This was the plaintiff's case.

Serjeant PARRY addressed the jury for the defendants, and said they had never made the slightest admission as to their liability to pay the plaintiff's claim. Indeed, the account was never looked into until after the action was brought. But although time was wanted in order to pay the money into court, no such thought entered into the mind of the local board as to deny the plaintiff's claim altogether. With reference to the charges in the account, witnesses would be called to show that those charges were exorbitant, and that much lower charges ought to have been made. The defendants had paid £412 1s. 9d. into court, and this, he submitted, was an ample sum in satisfaction for all the services rendered by the plaintiff. No doubt the valuation of gas-works required considerable experience, and 10 guineas a day, he admitted, would not be too much to pay for that purpose, but he should ask the jury, on behalf of the defendants, whether they thought the same charge ought to be made for the other services alleged to have been performed by this gentleman, seeing that those services were not such as required a large amount of scientific

ability. Some of the items in the account appeared to him to be for services such as an attorney's clerk might have performed; for instance, attending Mr. Cawley in the House of Commons, and conveying to him the views of the committee, and so on. If such an item had appeared in an attorney's bill, one knew what the charge would be. He should call before the jury the town-clerk of Ryde and Mr. Charles Lee, but, of course, in a case of this sort it was difficult to get professional men to come forward and give evidence against each other.

Mr. *Charles Lee*, examined by Mr. JOYCE.

I have had long experience as a surveyor and valuer—over 40 years. I have been engaged in the valuation of gas and water works, as well as railways and railway stations, in London. I was referee as to professional charges under the Lands Clauses Act. I am frequently employed as a referee. My usual charge for the valuation of gas-works is one guinea per hour, and I make a day of eight hours. Most frequently an arrangement is made beforehand, and then we take a per centage. I would value the largest gas-works in London in 10 days. I have frequently had 100 guineas for doing that sort of work.

Mr. PHILBRICK: That is 10 guineas a day.

Witness: I do not object to 10 guineas a day, but I tell you what my practice is.

Baron MARTIN (to defendant's counsel): You had better pay this sum. When will you be in a position to have the loan?

Serjeant PARRY: That relates to the payment of the gas company, not to these charges.

Examination continued: I have been through this account. I cannot form an opinion as to the extra trouble involved, but it appears to me that 30 days would have been sufficient to do the whole of this work in.

Cross-examined by Mr. PHILBRICK: I have never come across Mr. Stevenson. I was a witness in the Dundee case, but I do not remember hearing Mr. Stevenson give his evidence. I was paid £440 for the whole of that transaction, which was what I charged.

Mr. PHILBRICK: Do you know they paid Mr. Stevenson 500 guineas?

Witness: I do not know it.

Mr. PHILBRICK: Surveyors do not take out these matters in decimals?

Witness: Yes; I go through the accounts myself.

Cross-examination continued: My experience with gas-works is in valuing them for parish rating purposes. I generally make a bargain for a per centage. If I had been called in to value in this case I should have asked half per cent. We charge "on the Ryde scale;" half per cent. would be £310.

Mr. PHILBRICK: Is this your first attempt to tax a gas engineer's bill?

Witness: It is.

Re-examined by Serjeant PARRY: Thirty days would have been ample time to do all that was required here, so far as I can judge. A skilful man can do a great deal in ten days. I should not have employed an accountant here; I should have done all that he did myself. In the case of half per cent. being paid, an accountant would not have been employed. In the Dundee case we took the figures out.

Mr. PHILBRICK: Why, Mr. Guild and Mr. Jamieson were engaged in the Dundee case as accountants. Do you mean to say there was no accountant in the Dundee case?

Serjeant PARRY: How long did it last?

Witness: There were two arbitrations, and each lasted 15 days.

Mr. *H. D. Martin*, examined by Mr. JOYCE.

I am a civil engineer; have had 35 years experience in the profession, and in extensive practice. I have valued gas-works, but not extensively. I have been concerned in railways, harbours, and docks. I know the Ryde Gas-Works very well, and I think 46½ days would be a very long time to be occupied upon them. I think I could have done it in half the time. As a rule engineers always charge 10 guineas a day for a whole day of eight hours. In this case they are the charges for the miscellaneous services which appear so high. Those are not services that an engineer would charge 10 guineas a day for.

Mr. PHILBRICK: I have nothing to ask you.

Mr. *N. Beardmore*, examined by Mr. JOYCE.

I am a civil engineer. I have been engaged on the Lea navigation, and on behalf of water companies. I have been in general practice for 35 years. The proper charges for valuing gas-works, where a man of skill is employed, is 10 guineas a day. My own practice has never been to make hours. If an engineer is engaged in casual business, or as a witness, and is able to attend to other clients, five guineas a day is enough. I have been through the plaintiff's bill. The defendants have paid him £512, and I think that is a fair sum for his services.

Mr. JOYCE: You think it is a sufficient remuneration?

Witness: I myself am employed on Government boards and in some of the highest appointments, and I think it would be a very large charge to make if I charged 10 guineas a day. I think £512 is quite enough for the plaintiff's services in this case. In my own experience I have never seen such a bill as this for the work done.

Cross-examined by Mr. PHILBRICK: Gas is not my speciality. I send away gas out of the office. Water is my speciality, and I am a general consulting engineer. The charge of £22 8s. in the plaintiff's bill for lithographing, &c., is an out of pocket charge, as is also £63 1s. 3d. for travelling and hotel expenses. I allow all out of pocket charges.

Baron MARTIN: The hotel expenses would depend upon the amount of champagne consumed.

Witness: If a man goes to deliver an appointment to another man, I should think it would be a heavy charge to put down five guineas for it. I should think it ought not to be more than three guineas.

Mr. PHILBRICK: Is it not often a matter of great policy whom you should appoint as umpire?

Witness: Yes.

Mr. PHILBRICK: Would you do so by a clerk?

Witness: No; I should go myself, and I should charge from three to five guineas.

Mr. PHILBRICK: According to the time occupied?

Witness: Yes; if it took three or four hours it ought to be charged five guineas.

Mr. PHILBRICK: A professional man, an engineer, lives by his time?

Witness: Yes; quite so. If part of a day is employed at the office, 10 guineas is too much to charge when you have other clients coming.

Re-examined by Serjeant PARRY: I draw a distinction between such services as require scientific knowledge, and such services as waiting upon a member in the House of Commons. It would ruin any client if an engineer were not conscientious enough to do that. Ten guineas a day for everything required in getting up a case would make an account out of all reason. Gas engineers charge a per centage; civil engineers, with regard to water-works, very rarely work upon a per centage.

Mr. *Fardell*, examined by Mr. JOYCE.

I am the attorney in this case for the defendants, and attended the arbitration. It lasted only six days. I have here the shorthand writer's notes of the proceedings, which proves it.

Cross-examined by Mr. PHILBRICK: I am certain that the case lasted only six days.

Mr. *Pullen*, examined by Mr. JOYCE.

I am the town-clerk of Ryde. The plaintiff's account was first submitted to the local board for their consideration after the action was brought. The ordinary course of business with corporations is to refer such accounts to a committee. This account was not considered by the committee until after the action; it was then taxed by them and the amount paid into court. The plaintiff charges for attending a meeting of the committee on the 18th of June.

Cross-examined by Mr. PHILBRICK: Mr. Stevenson came down from town to attend the committee. He charges half a day for the journey down, also for one day there, and half a day for going up.

Serjeant PARRY and Mr. PHILBRICK having addressed the jury,

Baron MARTIN summed up. He said: Gentlemen of the jury, this is an action which Mr. Stevenson has brought against the Mayor and Corporation of Ryde. It was originally brought to recover the sum of £537 4s. 3d., but £412 1s. 9d. has been paid into court, and the question now is whether the plaintiff is entitled to recover the full balance of £145 2s. 6d., or any part of it. That is the balance which he claims, but you are not bound by that if you think proper to reduce it. This is one of those actions which it is rather difficult to try. The profession of an engineer is now a well-established profession in this country, and there are in it men of very great eminence—probably of the greatest eminence—and men of as high genius and talent and skill as any existing in this kingdom. On the other hand, there are plenty of a very contrary description. There are superior men, and there are inferior men in it. Mr. Stevenson is in the highest class of that business, and he makes a certain charge for the services he renders. To cut down those charges is the easiest thing possible by calling in people of not the same eminence, who will tell you what their opinion of his charges is, and who will say that if they had been employed they would have charged much less. There are a great many gentlemen in the law in the same position. When a young man enters into a profession he must be content with receiving a smaller income than when he gets older and more experience in his profession. A man has to work his way up, whether in the law or as an engineer. I dare say Mr. Stevenson might send in a bill which, if you were to submit to a variety of people, they would tell you that this or that item in it was too much, that his charges are not at all proper charges, and that they would have done the work cheaper than Mr. Stevenson has done it. According to the plaintiff's evidence—and it is entirely uncontradicted—a deputation came to him from Ryde in respect of the proposed purchase of the gas-works. They spoke to him about his charges, and Mr. Stevenson, referring to his book, said, "Here are my charges, and here are my bills." Thereupon, one of the members of the deputation said, "No; we will not look at them; we will trust to you to make the proper charges." You must ask yourselves, gentlemen, whether, if a man offers to lay before people a statement of the charges which he makes, and people will not take the trouble to look at them, it is not reasonable and fair that he should charge them what is his ordinary charge in such cases, and which one of the witnesses for the defendants in this case admits is ordinary and reasonable. The question really resolves itself into this—Mr. Stevenson has sent in a bill, and the town-clerk and the attorney who have been concerned in this case do not say a word in contradiction of his charges. But when the bill is laid before a committee, after the action is brought, the course they take is to allow the plaintiff 19 days at 10 guineas a day, and the residue of the 46½ days charged for they have thought fit to reduce to five guineas a day. The plaintiff says, "That is not the way in which I make my charges. My time is my money; it is by that I earn my bread and gain my fortune," as many other engineers have made large fortunes, and very properly so. The plaintiff says, "I charge 10 guineas a day in respect of all the time I was employed in the work; and people who employ me must take my character, my respectability, my name into consideration; and I will not employ myself in doing work which an engineer of my standing would not be employed upon, and I will not occupy my time in doing work which could be done by a clerk. I consider I have only done what it was my duty to do, and I expect to be paid for it accordingly." That is his case. On the other hand, there are these respectable gentlemen—whether of the same standing in the profession as the plaintiff I know not—but you have heard their evidence, and you will judge for yourselves what is the effect of the letters produced upon your minds. I need hardly tell you that the town-clerk is the person who acts for the corporation and attends to their business, and I have no doubt in this case the town-clerk is as respectable a man as can be. It appears that some time before the 13th of February an application was made by the plaintiff for payment of the money due to him, and Mr. Pullen, the town-clerk, writes back, and says: "In reply to your application for a further advance on account of your fees, I am desired by the local board to inform you that before paying any more money on account they would like to know the particulars and the amount"—a very proper thing to do. Then Mr. Stevenson sends in the account which is the subject of this action. It does not seem, however, to have been noticed, or anything done upon it, until the 8th of April, when Mr. Stevenson again wrote, saying, "I think I am entitled to ask for a substantial payment on account of services rendered." The town-clerk writes back on the 11th, saying, "If it rested with me, both you and I would have received our costs in this matter long ago," &c. Here there is not a word of objection to the items in the account. On the 29th of April, Mr. Stevenson writes again, "Be good enough to let me know when I may expect to receive payment of my charges." [The learned judge quoted further from the correspondence.] Now, it was not until the action was brought that the plaintiff's bill was at all considered by the defendants, and the result of their examination then was that they struck off a certain amount from some of the items. If you, gentlemen, think that the five guineas a day ought so to be struck off the days other than the 19 which are allowed, then the defendants are entitled to your verdict; but if you think, from the evidence in the case, that the plaintiff is entitled to that amount, you will say so.

The jury conferred together, and immediately returned a verdict for the plaintiff, damages—£145 2s. 6d.

Serjeant PARRY: Ought we not to have one day off the seven days which are charged as those during which the arbitrators sat? That would be 10 guineas.

Baron MARTIN: I do not understand Mr. Philbrick to say anything about that, or to admit anything with reference to it.

Mr. PHILBRICK: No, my lord.

The verdict was accordingly entered for the plaintiff for the amount claimed, and his lordship certified for a special jury.

SOUTHAMPTON COUNTY BENCH.

SATURDAY, JULY 27.

(*Before* W. C. HUMPHREYS, *Esq.*, *and* J. BERNARD, *Esq.*)

David Baine Millar and *Samuel Parnell Evans* were brought up, on remand, on the charge of defrauding the London and South-Western Railway Company, whose servants they were, of men, time, and materials.

Mr. BULLEN, barrister, appeared to prosecute, and Mr. LEIGH watched the case on behalf of Evans.

Frederick George Bemister, draper, living at Eastleigh, near Bishopstoke, produced a bill sent in by Millar for work done about February or March last, and was dated May 6, 1872. The work consisted of a swing lamp and piping to connect it with the other gas in the house. There were about 12 feet of piping. He saw Millar on the subject a month or two previous, and Evans did the work, assisted by Appleton. They did the work between half-past seven and nine in the mornings of three days. The bill was for 21s. 6d., but he had not paid it.

Cross-examined by MILLAR: Witness had spoken to Millar several times about the lamp before it was put up, but he did not recollect the address on the lamp

when it arrived. He could not swear positively that they were three mornings over the work.

By the BENCH: Millar was a tenant under witness, and therefore he had got him to put up the lamp, Millar alleging that he had a brother in London in the lamp line.

James Appleton said he was a gas-fitter in the service of the South-Western Railway Company, under Millar. Remembered being engaged on some work at Mr. Slade's, a butcher, at Woolston, about six months ago. He there fixed some gas-fittings, and was there about four days. He went there by Evans's orders. No one else was there. There were some iron pipes and brass fittings used about the work, and they came from the company's shop at Bishopstoke. Witness assisted Evans in taking them from the stores, and dug up the ground where the pipes were laid. His time was charged to the company at Southampton, and he was paid by them. Witness also did some work at Bemister's, Eastleigh, by Evans's orders. He was engaged two mornings fixing a lamp outside the door. The pipings and brass fittings for the lamp came from the company's workshop. He assisted Evans to bring them from the stores, and the company paid for his time. He remembered doing some work at Millar's house, since last September. They were some gas-fittings, and he was there nearly a week. Evans assisted him, and witness's time was charged to the company at Bishopstoke by Evans's direction. The materials for this work came from the company's stores, and he assisted Evans to take them. They were some piping and fittings.

MILLAR: Don't forget the chandelier as well, as they came from there.

Witness said he did not recollect anything about that. He had pointed out to Mr. Soper the materials and work done for Mr. Slade and Mr. Bemister. The meter was already fixed in Millar's house.

By Mr. LEIGH: Millar engaged him when he first came on to work. He was the foreman, and employed him as a gas-fitter's labourer, and after he was engaged he was told to go under Evans. He had been sent by both Evans and Millar to the stores for materials for the company's work. Witness supposed Evans was also bound to obey Millar's orders. He never worked a whole day at Mr. Slade's. He gave in his time to Millar. They might be at two or three places in the course of the day, when the time would be divided, but still charged to the company.

By MILLAR: Witness did not recollect being taken from any work he was doing for the company to do work for Millar. He might have taken lamps and other things directed to Millar down to the stores. He never remembered being paid for any time out of Millar's or Evans's pockets.

By Mr. BULLEN: Witness never saw any gas-piping at Bishopstoke station addressed to Millar.

William Grace, a gas-fitter in the company's service, said he was under Millar, and remembered doing some work at the shop of Mr. Drew, butcher, Bishopstoke, by Millar's directions. He was employed there about three days, during his ordinary working hours. Millar said he was to go there by Mr. Fisher's orders. He received no payment from either Mr. Drew or Millar. Whilst at work at Mr. Drew's, Millar told witness to speak to him before he made up his time; and the day before doing so he asked Millar how he was to make his time up, and was told to make it out "repairing lamps at Bishopstoke." He had pointed out to Mr. Soper the work and materials used at Mr. Drew's house. Seven lengths of two-eight pipe, about 4 feet three-eight brass tube, and a two-eight barrel union came from the company's stores at Bishopstoke. He took them by Millar's orders. No one worked at Mr. Drew's besides himself.

By MILLAR: Witness said Millar did not tell him to charge the time to him, and he would see Millar about it. The half-inch pipes and some of the T-pieces were at Drew's when he went, and Millar told him if he was short of anything he was to get it out of the stores, and he would replace it when his materials came down from London.

By Mr. BULLEN: Witness took a note of the dates in his pocket-book because Millar told him he was to take no notice of any one, as Mr. Fisher knew all about it, and he afterwards told him to charge it to Mr. Fisher. In making up his time-sheet he took the note.

William Clark, Fleming Arms, Swathling, said certain things were done at his house either at the end of last year or beginning of this by Millar, for which he had paid a bill of £2 18s. 4d. The work consisted of fixing lamps and gas-fittings. Evans did the work. No one assisted him that he knew of.

Mr. LEIGH: Witness employed Millar to do the work.

Mr. *John Burgess Soper*, engineer, residing at Basingstoke, remembered going to Mr. Slade's house on the 19th inst., and Appleton pointed out certain things there which had been fixed by himself and Evans. The value of the things so pointed out was £2 14s. 11d., and 18s. time. Witnes went to Mr. Bemister's, Eastleigh, on the same day, and Appleton there pointed out certain things done by himself and Evans. There was a lamp and tubing connecting it with the gas-piping in the house. The lamp was a 12s. one, and he had seen similar lamps at different stations. He estimated the value of the brass fittings and tubing at 6s. 10d., and time 2s. 8d. The value altogether would be £1 1s. 6d., and the bill sent to Mr. Bemister was for that amount. The materials he saw at Mr. Bemister's were similar to those he had seen at Waterloo station. He also went to Mr. Clark's, at the Fleming Arms, and saw certain work there which had been done by Evans. The value of the material used he estimated at £1 16s., and the time employed at 6s. 8d. The lamp he valued at 18s., and it was a company's pattern lamp. Previous to this he went to a house which Millar occupied at Bishopstoke, and certain work and materials were pointed out to him by Appleton, the value of which he estimated at £2 8s. 6d., and the cost of labour 12s. The time estimated by him, except in the case of the Fleming Arms, was that of a person doing the work on the spot.

By MILLAR: Witness said he knew that Messrs. Stevens had supplied materials to the company for many years, but did not know whether the lamps were supplied by them. He had compared the lamp at Mr. Bemister's with those at the Basingstoke station, and they were very similar.

By Mr. BULLEN: The lamp he saw at Mr. Clark's was not such a one as Stevens and Sons could supply for 8s.

Mr. *Ben James Fisher*, assistant engineer to the company at Bishopstoke, said the prisoners were not authorized by him to do any work off the premises. He never told Millar that Grace was to work at Drew's. He had not authorized Millar to use any part of the company's materials at his own house, nor to do work for either Messrs. Slade, Clark, Drew, or Bemister. He did not think Evans would be authorized to do work off the company's premises by Millar's orders. If he had done work off the company's premises he ought not to have returned any time at all. Millar had not the power of discharging Evans, nor had he such power over him as could have prevented his giving information against him.

By Mr. LEIGH: There were no special conditions in the company's regulations to prevent either Millar or Evans doing work on their own account. If Evans were ordered by Millar to get goods from the company's stores he would be right in getting them without asking questions. If Millar made a complaint against any one under him, witness would make an inquiry before discharging the party complained of. Millar was not paid for overtime, and witness never had occasion to complain of him for neglect of duty.

The prisoner Millar put several questions to witness for the purpose of eliciting whether he might not have left business for an hour or two without being found fault with, and was told that he might not have reported him for it.

By Mr. BULLEN: Millar had asked for leave of absence for a day occasionally. Mr. BULLEN said that was his case.

The Bench having decided to commit the prisoners for trial on the charges, Mr. Leigh applied to have his client liberated on bail; Mr. Bullen objected, but ultimately agreed to accept substantial sureties. The Bench accepted bail for both prisoners in £100 each, on the two charges, and two sureties each in £50.

Miscellaneous News.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

The Ordinary Half-Yearly Meeting of the Shareholders of this Company was held on Tuesday, July 30—The Rev. Dr. PHELPS (Master of Sidney Sussex College) in the chair.

The following reports were presented:—

The Directors Report.

The directors herewith submit to the shareholders a statement of accounts for the half year ending Midsummer, 1872, which accounts have been duly audited.

The profit and loss account for the half year shows a balance of £2310 8s. 9d., which, with the balance of £2441 13s. 1d. on the last half year's account gives as the profit on the year's working, £4752 1s. 10d.

The directors recommend a dividend for the half year after the rate of 10 per cent. per annum on the consolidated stock, and after the rate of 7 per cent. per annum on the amount paid up on the new shares, payable on or after the 1st of August next, free of income-tax.

The directors regret to have to announce to the shareholders that in consequence of the increased price of coal, labour, and materials, they were compelled to raise the price of gas, from the 24th of June last, from 3s. 9d. to 4s. per 1000 cubic feet.

The retiring directors are Mr. Charles Edward Brown and Mr. Joseph Wentworth, who are eligible for re-election.

ROBT. PHELPS, Chairman.

Cambridge, July 11, 1872.

The Manager's Report.

Gentlemen,—It being the close of another financial period, I beg to lay before you the accompanying accounts, which have been duly audited.

The gas and meter rental is satisfactory, and the business done in coke, tar, sulphate of ammonia, and fittings during the past half year have been of the average amount.

The public lighting, the illuminating power, purity, and pressure of the gas have been throughout good, and the requirements fully complied with.

Owing to the very high price of iron, I have thought it prudent to recommend as little in the way of alterations and extensions for the present as is consistent with the safety of the company's working.

WM. WOOD, Manager.

Summary of Balance-Sheet for Half Year ending Midsummer, 1872.

CAPITAL ACCOUNT.

Dr.		*Cr.*	
Consolidated stock	£37,440 0 0	Expenditure on capital account to Christmas, 1871.	£56,559 1 0
New shares	9,360 0 0	Ditto since	£178 12 6
Loans	9,300 0 0	Less received for old materials	148 9 5
Balance	489 4 1		30 3 1
	£56,589 4 1		£56,589 4 1

PROFIT AND LOSS FOR HALF YEAR ENDING MIDSUMMER, 1872.

Dr.		*Cr.*	
Manufacture	£6,292 11 11	Sale of gas and meter rents.	£8,958 7 0
Distribution	1,035 15 8	Less bad debts and allowances	18 0 2
Miscellaneous expenses	1,808 5 11		£8,940 6 10
Balance (half year's profit)	2,310 8 9	*Residual Products:*	
		Sale of coke (less bad debts, discounts, and allowances)	1,479 14 4
		Ditto tar	154 9 9
		Ditto sulphate of ammonia (less allowances)	643 19 7
		Fittings profit (less bad debts, discounts, & allowances)	217 11 1
		Rents	11 0 3
	£11,447 1 10		£11,447 1 10

GENERAL BALANCE.

Dr.			*Cr.*		
Revenue account		£2,310 8 9	Amount owing for gas	£3,285 17 3	
Manager's ditto		300 0 0	Ditto coke	561 17 8	
Floating assets, Christmas, 1872	£7,335 15 0		Ditto fittings	828 7 7	
			Ditto tar	149 1 9	
Bal. of revenue, Christmas, 1871	2,441 13 1		Ditto sulphate of ammonia	412 10 5	
			Ditto rent	5 0 0	
Less div., declared Jan. 30	1,199 12 0				5,242 14 8
		7,377 16 1	*Stock in hand:*		
Unpaid dividends		11 13 0	Coals	£1,340 6 9	
			Fittings	552 12 0	
			Tar	104 0 0	
			Sulphate of ammonia	56 0 0	
			Meters	817 8 6	
					2,870 7 3
			Capital account		489 4 1
			Balance at banker's		1,597 11 10
	£10,199 17 10				£10,199 17 10

The CHAIRMAN moved that the reports be received and entered on the minutes.

Mr. FETCH seconded the motion, and called attention to the "loan" item in the capital account, by which £5000 was owing to the executors of the late H. R. Evans, Esq., on mortgage, and £4300 to Messrs. Foster, on a temporary advance. He could not understand Mr. Foster's claim to be temporary, and would be glad to see both the term and the debt expunged. If the company were to at once relieve themselves of this incubus, they might incur it again when necessity absolutely required it. He thought the loan should be paid off even at a small sacrifice to dividend.

Mr. S. PEED said that he was in some way responsible in this matter, and when he explained the actual state of things, he thought they would say it was a great boon to the shareholders. Under their last Act of Parliament they had power to borrow £9300 in respect of the original capital, being the proportion which the Legislature allows to all companies. That money had been borrowed at 4 per cent., and until they had a note from Messrs. Foster, they considered it best to remain quiet and leave the loan as it was. It was a portion of their capital, and so long as Messrs. Foster were contented, the company was contented. The money was borrowed at 4 per cent., and they paid 10 per cent. upon it; so that it was a good thing. There was no intention to pay off the loan; the company did not want to be free of it, for that would be imposing 6 per cent. upon them.

The CHAIRMAN: If we did not borrow it, we should have to raise capital to that amount.

Mr. CLAYTON supported Mr. Fetch, and observed that, although he asked a question about the same item at the last meeting, he failed to understand it.

Mr. FETCH said he understood the case, but he, nevertheless, maintained that the money ought to be paid off. He would not accept a loan of £10,000 of a man at 4 per cent. if he could make 10 per cent. of it.

Mr. S. PEED said the company was not like an individual: a company had no breeches pocket.

Mr. FETCH also referred to the fourth paragraph in the directors report, and said it would have been better to have put it plainly, that unless the price of gas were raised they could not pay the 10 per cent. dividend.

Mr. BROWN: Don't you know, then, that coal has risen one-third?

Mr. FETCH: I do know it has risen.

Mr. S. PEED pointed out that whatever company's account they took up, they would see a loan account. That was part of the capital.

The CHAIRMAN said the directors had not the least intention of paying off the loans.

The reports were then agreed to.

On the motion of the CHAIRMAN, seconded by Mr. D. ADAMS, a dividend was agreed to in accordance with the recommendation of the directors.

Messrs. C. E. Brown and J. Wentworth, retiring directors, were re-elected unanimously.

Mr. BROWN, in expressing his acknowledgment of this renewal of confidence, briefly referred to the past, and said the company was at present going on satisfactorily. He trusted that circumstances would arise, and public matters so alter, as that they might go on as satisfactorily and prosperously as they had hitherto done. With regard to Mr. Wentworth, who was from Cambridge at that moment, he was sure he might say, in his behalf, that he would give his best energies due to the discharge of the duties of the office.

Messrs. J. Dennis and John Hall were unanimously re-elected auditors.

Mr. DENNIS acknowledged the compliment.

Mr. S. PEED proposed a vote of thanks to the chairman for his conduct in the chair, and for his continued energy and zeal on behalf of the shareholders.

This was seconded by Mr. FETCH, who alluded to the fact of the accounts being so well kept that he did not attend the meetings so often as formerly.

The CHAIRMAN said he felt quite proud in having been able for so long a time to retain the confidence of his brother directors and of the shareholders; but he could not have done so had he not been associated with thorough business men. When Mr. Fetch did attend the meetings, he drew their attention to things of importance, and it was a pleasure to hear him now say that he was satisfied. He (the chairman) thanked the meeting for its vote, and the proceedings closed.

YORK GAS COMPANY.

The Ordinary Half-Yearly Meeting of Shareholders was held on Thursday, August 1—Mr. D. HILL in the chair.

The CLERK (Mr. Sellers) read the report of the directors, of which the following is the summary:—The directors recommended that a dividend of 5s. per share upon the old shares, and 4s. per share upon the new shares, be declared, and paid on the 6th inst., free from income-tax. From the great reduction in the price of gas, from 3s. to 2s. 6d. per 1000 cubic feet, which took effect from the 1st of January last, and from the large increase in the cost of material and in gas manufacture, the usual profit had been considerably reduced. The increased consumption of gas, especially for cooking and warming, had been fairly maintained. The directors thought the public were to be congratulated upon receiving from the company all advantages above the statutory dividend due to the shareholders, and now being supplied with gas below that charged in most large towns. The directors regretted a vacancy at their board, through the recent death of their colleague, Mr. John Craven. To supply the vacancy thus occasioned they recommended the appointment of Mr. Sheriff Varey, a gentleman whose appointment the board believed would be received with satisfaction by the shareholders. The trade account showed the following receipts:—Sales of fittings, £1158 17s. 8d.; gas, coke, &c., £13,350 12s. 2d.; returned packages, &c., £11 5s. 8d.; interest allowed by bankers, £55 7s. The expenditure had been in fittings and fitters wages, £1027 7s. 8d.; coal and lime, £4126 2s. 6d.; retorts, meters, &c., £1587 10s. 9d.; direction, £300; salaries and stokers wages, £1388 3s. 10d.; rates and taxes, £487 7s. 4d.; printing, &c., £57 12s. 8d.; law, £17 7s. 7d.; bankers charges, £37 16s. 6d.; sales returned, £40 14s. 6d.; discounts, £4 11s. 8d.; bad debts, £10 19s. 2d.; depreciation and contingent fund, £500; balance, £4634 18s. 11d., which, added to the balance on hand on the 1st of January, makes a total of £12,924 14s. 3d.

The CHAIRMAN, after referring to the loss the company had sustained in the death of Mr. Craven, made a few remarks upon the report. He said the directors had carefully watched the result of the reduction which they had made in the price of gas, a reduction which had exceeded all previous reductions, as it was from 3s. to 2s. 6d. per 1000. After six months experience of the working of that reduction, they found that their earnings had not been equal to the usual dividend, but the reduction had been somewhat compensated for in this way. The directors commenced the half year with a very large stock of coke on hand, and in consequence of the rise in the price of coal, they had been enabled to clear off the whole of their coke, so that the income under this head was much in excess of that of ordinary half years. They had been able, notwithstanding the great reduction which had been made in the charges for gas, to earn the full dividend. He looked forward to better times, and as they had coal for another year, they were in a far superior condition to that of other companies they read of in the newspapers, and also as to the prices of gas in other towns. He thought it was likely that the directors would be enabled to keep the charges for gas down to the present price, owing to the peculiarly favourable circumstances in which the company was placed. He moved that the report be received and adopted.

Alderman WEATHERLEY seconded the motion.

Mr. HOLTBY inquired what was the price the company paid for their coal.

The CHAIRMAN, in reply, stated that the parties who supplied the coal objected to the figure being made known.

Mr. HOLTBY said he did not wish to press his question, as his only object was to show that the directors had made a good bargain.

The CHAIRMAN observed that they had undoubtedly made a good bargain. Great prudence was displayed in the selection of the colliery from which the coals were furnished. The board tried thirty tons each from five different companies, and each description of coal was carefully tested, Mr. Sellers rendering great assistance in the matter. They found that two of the qualities of the coal out of the five were very nearly alike after working out the result, and the late Mr. Thomas said that he was sure the price of coal would not be lower for some years to come, and the board, therefore, determined to accept a contract at the price offered from one of the two parties. One firm would not contract for a longer period than one year, but the other was willing to supply coals at the price for three years, and the directors, therefore, at once accepted the latter offer. They had done right, the price of coal having considerably increased in price since that time. He was not at liberty to name the charge, as the party did not wish it to be known, even by their neighbours.

The report was then adopted, the dividend recommended in the report declared, and Mr. Sheriff Varey elected to fill the vacancy at the board.

The CHAIRMAN, in reply to Mr. Holtby, said he had determined to resign his chairmanship of the board, knowing that he could not devote that thought, care, and attention which the position demanded at his hands, and have that frequent and easy intercourse with the clerk that was required, so as to secure his own personal comfort and advance the interests of the company. He had therefore resolved to vacate the chair after that meeting. When he was the vice-chairman, if he had thought the chairmanship would have involved him in so much responsibility, and occupied so much of his time, he should have shrunk from taking the office. He was not going to leave the board, but should remain a member of it, and make himself as useful as he could.

Mr. HOLTBY said a few months ago his attention was attracted by a letter published in the *Yorkshire Gazette*, in reference to some letters written by a gentleman in Leeds and published in the newspapers of that town. From the tenour of the letter he had named, and which was written by one of the directors of this company, it struck him that the communication might have been seen by the directors before it was sent, but whether this was so or not he was not aware.

The CHAIRMAN: It never came before the board at all.

Mr. HOLTBY considered that the writer of the letter had shown a great want of judgment and discretion in penning such a communication, especially when it had not been submitted to the chairman and the members of the board. It was well enough for a private individual to write and publish such a letter, but it was quite out of place for any gentleman having the management of a public company to do. The language he had used was, to say the least, incautious and indiscreet. The letter commenced by stating that the writer had read several articles in the Leeds newspapers by Mr. George Pyper, "in condemnation of the management of the Leeds Gas-Works, as they are now carried on by the Leeds Town Corporation." He did not see the slightest reason upon earth why the York Gas Company, through one of its directors, should go out of its way and attack the management of another company. During the last twelve months and more they had had great responsibilities devolving upon them with regard to the management of their own company, and therefore he thought that as far as possible they should refrain from interfering with the concerns of other companies, and not cast aspersions upon them. He said nothing against any private individual doing so if he felt himself justified in such a course, but that a director of the company, as a director, should write such a letter, and afterwards publish it, was perfectly unjustifiable. The letter was in the *Yorkshire Gazette* of the 27th of April last, and it alluded to a letter which had been sent by Mr. Grayston to Mr. Pyper at Leeds, and which had been published by that gentleman in the *Leeds Mercury*. In this letter Mr. Grayston said, "I read your letters in the newspapers on the gaslight system at Leeds. As a director of the York Gaslight Company, I may be permitted to address to you a word or two, not on the immediate subject about which you complain, but upon a question of a higher and more serious nature, involving grave and important charges against corporation gaslight companies generally." Such language as this ought not by any means to be used by a director of the company, who evidently wanted a little more judgment and less zeal. In another part of his letter, Mr. Grayston said that "one of the most audacious doings of the day is that of town corporations buying up public gaslight companies, and then making the consumers of gas pay out of the price charged for gas large annual sums of money for all sorts of Corporation schemes." The word "audacious" was very strong and ought not to have been used. The latter had no doubt come under the notice of the Leeds Gaslight Company, who would look upon it as an expression of opinion on the part of the whole York Board, but it seemed that it had been written and published in the newspapers without the knowledge of the chairman and his brother directors. Certainly Mr. Grayston ought to have exercised more care and discretion in a matter of this sort.

Mr. GRAYSTON: I should like you to read the whole letter, and not pick out passages here and there.

Mr. HOLTBY declined to do so, considering that he had already said sufficient, and he was afraid the letter might do some injury to that company. It ought never to have been published. Apologizing for having detained them so long, he would conclude by saying that Mr. Grayston seemed to have been much pleased with his own baby.

Mr. GRAYSTON said this was not the first time that Mr. Holtby had made personal remarks respecting him, and whether the present attack was by himself or by his client, he knew not. If Mr. Holtby came to the meeting to give a lawyer's opinion it was worth very little indeed, and lawyers' opinions were never given without a fee. Mr. Holtby's judgment was greatly at fault on the subject, as he perfectly well knew that the Corporation of York had for a length of time been using all their endeavours to purchase the gas company, so that by supplying the citizens with gas they might be enabled to apply the profits thereof to other than gas purposes, and he (Mr. Grayston) was strongly opposed to the adoption of any such course. This was the subject upon which he wrote to Mr. Pyper. The Corporation of Leeds considered that the gas company of their town was far better in their hands than in the hands of private parties, and nothing could be more absurd than to suppose that a corporation could manage affairs better than a private company. Any private company could properly manage its own affairs without the interference of corporations, and manage them far better too. He knew the early history of the York Gas Company, and the antagonism that had at one time to be encountered. He was acquainted with all the circumstances from the commencement, and he had much to do with the formation of that company, and he could assure the shareholders that its best interests would always be cared for and well protected in his hands and those of his brother directors. He condemned the supply of gas being under the control of corporations, and when he wrote to Mr. Pyper on the subject, that gentleman in reply strongly urged him to allow his letter to be published in the newspapers, so that it might come under the attention of the Corporation Gas Committee at Leeds. This was the reason why his letter had been published, and under all the circumstances he considered that Mr. Holtby had made a very unfair attack upon him. He was very much opposed to Mr. Leeman's bill, giving compulsory powers to corporations to purchase gas and other works, and he urged upon the shareholders the necessity of sticking to their property and not parting with it unless it were forcibly taken from them. If they should at any time be compelled to dispose of their property, let them take care that they obtained the full price which would justify them in selling it.

Mr. HOLTBY said the personal remarks made respecting him by Mr. Grayston were quite uncalled for, and he threw back his insinuations with contempt as to his appearing there at the request of a client or anybody else. He merely stated what he thought he was perfectly justified in doing, and he must say that in his opinion Mr. Grayston had allowed his zeal to get the better of his judgment. Mr. Grayston was paid £50 per year for his services at the board as a director, and the shareholders did not pay him that money to write letters in the newspapers and abuse other gas companies. Directors ought to be men of settled and firm minds, and devote the talents they possessed to the interests of the company they represented, and not waste their energies and usefulness by appearing in the public newspapers.

The CHAIRMAN observed that unless there was some definite resolution put before the meeting the discussion could not go on. He thought they had heard already sufficient upon the subject. He considered that it was due to them as shareholders that he should see they had free discussion on any matter, but at the same time avoid personalities, and go on agreeably and comfortably. What they wanted was to make the meetings interesting, and to point out any indiscretions that might arise in the management of the concerns of the company, and they were bound to hear criticisms in this respect. He hoped that what had already been said would be satisfactory to all present, and that they should not go further into the question.

Mr. HOLTBY intimated that he had drawn up a resolution, but he did not wish to put it after what had taken place.

The CHAIRMAN gave, as a proof of the satisfactory way in which the company was managed, as to its finances, the fact that out of an income of £23,000 they had had bad debts to the amount of only £29 17s.

Mr. FELTOE moved a vote of thanks to the chairman and board of directors for the efficient manner in which they had conducted the business of the company for the past half year.

Mr. MARTIN SCOTT seconded the resolution, and it was adopted unanimously.

The CHAIRMAN, in returning thanks, said he was much obliged to the shareholders for the kind manner in which they had adopted the resolution. He could only repeat the observations of an old country squire, who, in responding to a compliment paid to him, said—"Gentlemen, if you are satisfied I am gratified, and if you are gratified I am satisfied."

The meeting then terminated.

KIDDERMINSTER GASLIGHT AND COKE COMPANY.

The 104th Half-Yearly Meeting of the Shareholders of this Company was held on Tuesday, Aug. 6—Mr. J. KITELEY in the chair.

The following report of the directors was presented:—

The directors have to report to the shareholders that the transactions of the half year just passed have resulted in a profit of £1188 9s. 3d., which, added to £401 7s. 10d. profit brought forward from last half year, makes a total of £1589 17s. 1d. This total they recommend should be appropriated as follows:—Dividend on original and additional shares—viz., on £26,400, half year at 5 per cent. per annum, free of income-tax, £660; interest on £3600, preference stock, half year, at 5 per cent. per annum, free of income-tax, £90; dividend on original and additional shares, at 5 per cent. per annum, free of income-tax, in respect of half year ending 31st of December, 1870 (in which half year not any dividend was paid) £660—£1410; to be carried forward to next half year, £179 17s. 1d.; total, £1589 17s. 1d. In submitting the financial statement for the six months ending June 30, the directors have pleasure in proposing to pay to the shareholders the remaining dividend at the rate of 5 per cent. per annum, in respect of the half year ending the 31st of December, 1870, in which no dividend was paid. In view of the enormous increase in the price of coal, labour, and materials of all kinds, which characterizes the commencement of the current half year, the directors feel it to be absolutely necessary to make some increase in prices charged for gas. It is, therefore, proposed to advance the rates from the 1st of October next; due notice thereof being given to every consumer. This step would have been rendered imperative at an earlier date, but for the favourable contracts for coal effected by the directors last year, prior to the great advance in that and other articles of consumption.

The CHAIRMAN, after referring to the satisfactory features of the report, said he was afraid the prospects for the next half year were not so encouraging, and he should feel quite satisfied if they were able to pay the old dividend at the rate of 5 per cent. Coal, labour, and everything else were increasing in price; and from the dulness of trade in the town, they might fairly presume that the next half year would not be so flourishing as the past.

Mr. C. HARDING (Birmingham) asked what was the proposed increase in the price of gas referred to in the report.

The CHAIRMAN said the directors could not decide this till their September meeting?

Mr. HARDING asked if there was likely to be any opposition to the increase?

Mr. W. TALBOT said it would be so self-evident to consumers that an increase was necessary that he did not think they would make a fuss about it.

Mr. HARDING called attention to the debt of £8000 which the company owed, and the fact that they were also indebted £3000 at the bank, and urged the desirability of providing for its reduction. He also referred to one or two entries in the balance-sheet which he thought would be better differently inserted.

The CHAIRMAN said the auditor considered the way in which the balance-sheet was drawn up the best. After some further remarks, he moved the adoption of the report.

The MAYOR (Mr. Boycott) seconded the motion, which was carried.

A resolution was also passed, on the motion of the CHAIRMAN, seconded by Mr. CARTWRIGHT (Bewdley), that the dividend and interest on the preference stock be paid forthwith.

Mr. R. BREWSTER was re-elected auditor; and votes of thanks were passed to the chairman and directors and the manager (Mr. Dougall) for their attention to the interests of the company.

LEWES GAS COMPANY.

The Annual Meeting of Shareholders was held on Monday, Aug. 5—Mr. E. MORRIS in the chair.

The CLERK (Mr. Hillman) read the minutes of the last annual meeting, and the statement of accounts and report for the present year. The report was as follows:—

The balance of £1692 8s. 1d., as shown by the statement, is the profit for the year, and with the balance of the dividend account of last year, £22 9s. 9d., amounts to £1714 17s. 10d. Of this sum the directors certify that £1527 6s. may be divided among the shareholders, being at the rate of 9 per cent. per annum (3 per cent. having been already paid on account thereof), that the sum of £150 be added to the reserve-fund, and that £37 11s. 10d. be retained on the dividend account. It will be observed that the increase in the consumption of gas is as follows:—Lamps, £12 16s. 6d.; consumers, £167 7s. 4d. In consequence of the great advance in the price of coals, and the increased rate of freights, the directors have been under the necessity of announcing to the public that from the 24th of June last the charge for gas will be increased from 4s. 2d. to 4s. 7d. per 1000 cubic feet. The reserve-fund, amounting to £1300, with the addition proposed to be made in the present year, will stand at £1450. There have been thirteen meetings of the directors since their election, of which Messrs. William Farnes, Charles Parsons, and John Bates have attended all; Mr. Ebenezer Morris, twelve; Mr. John Latter Parsons eleven; Mr. Robert Crosskey, ten; Mr. Henry Browne, eight; Mr. John Hodgkin, six; and Mr. John Saxby, one.

The statement of accounts showed receipts for the year ending the 24th of June last amounting to £3657 14s.; while the expenses of all descriptions amounted to £3965 6s. 7d., leaving a balance in hand of £1692 8s. 1d. on the year's transactions. The amount of capital called up by the company has been £16,970 from shareholders and £5000 on loan bonds, and the reserve-fund amounted to £1300. Against these and some small liabilities there were shown assets amounting to £25,316 6s. 5d., which, after deducting all liabilities, left £1714 17s. 10d., available for dividends.

The CHAIRMAN remarked that it was a very satisfactory report, and moved that the same be received and entered upon the minutes, and said he would be willing to furnish any information any gentleman might desire.

Mr. R. CROSSKEY seconded.

The CHAIRMAN read a letter from Mr. Burwood Godlee, regretting his inability to attend the meeting, in which it stated that he (Mr. Godlee) agreed with the report, and that the directors had done wisely in raising the price of gas. Further, it set forth that some had a desire for an Act of Parliament, and that he (Mr. Godlee) was willing to bear a proportionate part of the expense in securing the same, and, if needs be, forego a little profit.

Mr. E. BLAKER urged the importance of having an Act of Parliament. It was of great importance that they should have protection, and in previous years at these meetings he had hinted the same question to the shareholders. With regard to the report, it was highly satisfactory. One question he would ask as to plant, which was estimated at £17,199 0s. 8d. He asked whether it was valued yearly or how they arrived at that sum, and whether any allowance was made for wear and tear?

The CHAIRMAN intimated that it was not valued yearly; the present sum was precisely the same as last year.

Mr. LENNY having made similar remarks as to the stock-in-trade, referred to the Act of Parliament. He had just been to a meeting at Eastbourne, and they were in a fog. Their Act of Parliament limited them to a specific sum, and owing to the increase in the price of coals, the expenditure was greater, and notwithstanding this they were unable to go farther than the limit, unless they applied to Parliament for a further extension. 5s. a 1000 feet was the charge at Eastbourne, and they (the Lewes directors) could do as they liked, as they were not bound down by any Act. Mr. Lenny went on to say that this company ought to pay 10 per cent., and then, commenting on the reserve-fund, he characterized it as all bosh. He enumerated various sums set aside since 1868 for the reserve-fund, and submitted that interest ought to be received for the amount. The shareholders were deprived of the interest on those sums. He then made a few remarks as to questions mentioned at these meetings.

The CHAIRMAN replied by saying that some of the remarks made at these meetings should be for the consideration of the directors alone, such as any little matters of small importance. As to the Act of Parliament, they were at present an unlimited company, and as to the reserve-fund, he upheld this strongly, maintaining that it was absolutely necessary. The reserve-fund consisted of undivided profits of the company, and if they did not have this, money would have to be borrowed, and in that way it was bringing them in 9 per cent.

Mr. HODGKIN explained the necessity of a reserve-fund. It was much required in the event of any accident that might occur.

Mr. C. PARSONS was in favour of a reserve-fund, as they often overdrew at their bankers, and then they had to pay interest. Last year a few pounds were paid, but none this year.

Mr. LENNY considered it the most expensive and tedious mode of raising money; they ought to raise it in shares.

Mr. HODGKIN observed that the directors had adopted this mode of keeping accounts according to the Joint-Stock Companies' Act. He moved that a dividend of 9 per cent., as recommended by the directors, be paid to the shareholders, less the amount paid for an *ad interim* dividend.

Mr. J. L. PARSONS, in seconding, spoke of the importance of a reserve-fund. They were liable to accident by the neglect or misfortune of their workmen. With reference to the dividend, he considered they were legitimately entitled to 10 per cent. At Margate 10 per cent. was paid; Ramsgate, 10; Faversham, 10; Lewes, only 9. At Hastings the present charge for gas was 5s. per 1000 feet; Lewes, 4s. 7d.—the advanced price. At Hastings 8 per cent. was paid. At Ashford, the price of gas was 6s. 8d. per 1000; at Faversham, 5s. 9d.; Torquay, 6s. 8d. He considered that Lewes was very fair. With regard to the Act of Parliament, if that was proposed, it would be good-bye to their 10 per cent.

Mr. BLAKER asked him to prove that, and Mr. Parsons mentioned Brighton as an instance. There 7 per cent. was paid, and by their Act of Parliament they were not allowed to receive more. There £4 5s. was charged for each public lamp, but at Lewes only £3 5s., and at Hastings £4 17s. 6d. was charged. He would not have an Act of Parliament at any price.

After a few other remarks, the resolution was carried *nem. dis.*

On the motion of Mr. BLAKER, seconded by Dr. MASSEY, the following gentlemen were appointed directors for the ensuing year:—Messrs. H. Browne, E. Morris, J. L. Parsons, W. Farnes, C. Parsons, J. Hodgkin, R. Crosskey, J. Saxby, and J. Bates.

Messrs. C. R. Kemp and Mr. M. S. Blaker were re-appointed auditors, with the thanks of the shareholders for their past services.

Mr. BLAKER proposed a vote of thanks to the directors.

Dr. MASSEY seconded the resolution, which was put and carried.

Mr. J. L. PARSONS returned thanks on behalf of the directors, and, briefly alluding to the Act of Parliament, said he did not believe in law.

Mr. R. CROSSKEY was in favour of an Act of Parliament, and thought that the reserve-fund should be considerably larger. He should like to see it raised to £2000.

Mr. J. L. PARSONS proposed a vote of thanks to the chairman, and he having responded, the meeting terminated.

FORFAR GAS CORPORATION.

PROPOSED REDUCTION IN THE PRICE OF GAS.

The Meeting of this Corporation was held on Monday, July 29, when Mr. ALEXANDER LOWSON, convener of the Managing Committee, submitted the following report:—

"The first year of our existence as a gas corporation having now come to a close, I deem it proper that you should have, along with the audited accounts, a statement showing the amount of work done, the amount of money made, how that money should be disposed of, and a few comments on our future prospects.

"The gas manufactured in 1870-71, as shown by the station-meter, was 13,694,800 cubic feet. In 1871-72 it was 15,529,500 cubic feet, being 1,984,700 cubic feet more than in any previous year. The quantity of gas sold as at the 15th of June, 1872, was 13,475,400 cubic feet, or 1,184,450 more than the year before; and, as will be seen from the balance-sheet, the surplus profit for the year is £1479. The amount of annuities paid on the 15th of July was £675, but from this sum falls to be deducted the annuity held by Mr. Barry, now redeemed, amounting to £4 17s. 6d., and the income-tax on the £670 2s. 6d. remaining. After deducting Mr. Barry's annuity at the rate of 5½d. per pound, £14 13s., makes the sum to be paid for annuities £655 9s. 6d. This deducted from £1479 still leaves £823 10s. 6d. of a free surplus to dispose of. The question now for consideration is the way in which the Act under which we work regulates the disposal of surplus profits. Our Act is different from most local gas Acts, in having no provision for voting surplus profits to the Police Commission, for the purpose of carrying out improvements, as in Arbroath, for instance. It was thought by the committee who effected the transfer to be the better mode to allow all profits to go to the reduction of the price of gas. In schedule A to the Forfar Gas Act, which is the minute of agreement between the Town Council and the directors of the now defunct company, in the 7th clause we find the following:—'The said corporation shall yearly at their annual meeting make up an estimate of the revenues to be derived for the then current or ensuing year from the sale of gas, secondary products, and others, and also an estimate of the sums required to meet for such year the said annuities, expenses of management, maintenance of work, and repairs, materials, and wages, and other annual outlays, including interest on borrowed money and any payments to sinking-fund, and they shall fix the price of gas and other products for the year then current or ensuing, *so that the revenue shall as nearly as possible meet the said annual payment and expenditure for each year*,' so that after providing for the sinking-fund (C. 63), which does not come into operation until the expiration of three years from the passing of the Act, and the contingent-fund (C. 64), you must then apply the free surplus profits to the reduction of the price of gas. The manner in which I would recommend the Gas Corporation to dispose of the £823 10s. 6d. is to reduce the price of gas 10d. per 1000 cubic feet. This would absorb £625—that is calculating 10d. off 15,000,000 cubic feet—and put the remaining £198 10s. into the contingent-fund. I submit this as a suggestion for consideration at the annual general meeting, when the printed accounts are in the hands of the members, and an estimate has been prepared, and the gas-rate for next season falls to be fixed.

"But for the unprecedentedly high price of coal we would have had the pleasing prospect of being able in a short time to reduce the price of gas to a very low figure. For the next season we have contracted for more coal than will serve us at little more than the price we paid last year, but should the present high rate for coal be maintained till next year at this time—which I think is unlikely—we shall not be able perhaps to continue the price of gas at 5s per 1000 cubic feet. However, the additional apparatus and increased manufacturing capacity of the works, which will be in full operation by the lighting season, will enable us to produce a better article at a reduced figure; and should the inhabitants of Lunanhead and Kingsmuir think of a gas supply, under a special arrangement as to the expense of pipes, we will be able to give them all they may require."

The accounts were ordered to be printed.

HEREFORD CORPORATION GAS-WORKS.

At the Quarterly Meeting of the Hereford Town Council, on Tuesday, Aug. 6—the MAYOR (E. E. Bosley, Esq.) presiding—the following reports were presented:—

Report of the Gas and Water Works Committee.

Gentlemen,—Your committee beg to report that they have contracted with Messrs. T. and H. Carless to erect a lightning conductor against the chimney-shaft at the water-works at a cost of £13 15s. They have also directed the payment of £41 11s. 6d. to Messrs. Nixon, Taylor, and Cory for coals. Your committee have also entered into a contract with the Gas Management Committee to light the whole of the public lamps all night, but regulating the times for lighting and putting out the same according to the seasons, for twelve months, from the 1st of August, at a cost of £3 12s. 6d. per lamp. This will increase the next lighting-rate one halfpenny in the pound, but the additional two months lighting will be so great a boon to the public that your committee recommend the ratification of this contract by your board. They have also directed that the lamps be repaired and handed over to the Gas Management Committee in good condition. They have also examined the quarterly bills, amounting to £150 4s. 10d., and send them up for payment.

EDWIN EDWARD BOSLEY, Chairman.

Report of the Gas Management Committee.

Gentlemen,—We have to report that as the contract for the supply of gas coals will expire on the 31st inst., we issued advertisements soliciting tenders for the supply of 4000 tons, to be delivered between the 1st day of September and the 1st day of May next. To this advertisement we only received one reply, which was from the Broughton Coal Company, offering to supply gas coal at the railway station, Barr's Court. The price was so great an increase upon that previously paid that your committee did not feel justified in accepting it. Subsequently an offer was made by the South Wales and Cannock Chase Coal Company (Worcester agency) to supply during the present month 500 tons of Wigan gas coal, delivered to the Barr's Court station. This offer your committee accepted, and the coals are now being stored at the gas-works. In order that the accounts for this department may be kept separate and distinct, we have made arrangements for the manager to keep all the accounts, and appointed a sub-committee to examine the same monthly; and that cheques upon the treasurer be drawn by the finance clerk in the usual way. The committee recommend they be empowered to order from time to time the payment of such sums as may be requisite for the carrying on of the business of the gas-works, as the payment of such moneys having to be delayed until the next succeeding monthly or other meeting of the council may be inconvenient. The new retort settings are progressing satisfactorily, and will be ready for use during the coming winter. Arrangements have been made with the Gas and Water Works Committee (subject to your approval) for the lighting of the public lamps all night throughout the year, at £3 12s. 6d. each lamp. The bills, amounting to £63 1s. 8d., have been examined, and are sent up for payment.

EDWIN EDWARD BOSLEY, Chairman.

Mr. ANTHONY said he would move the adoption of the report, with the omission of that part which referred to the lighting of the public lamps at a cost of £3 12s. 6d. It was their duty to the citizens to secure good public lighting, but he thought the council should not enter into such a contract with the present price of coal, which increased the cost of gas 1s. 6d. per 1000 feet. In the face of this state of things, no one could tell what might occur; but his own opinion was that there would be a reaction, and that the price would go down.

Mr. GARROLD moved, and Mr. CAM seconded, the adoption of the report as presented to the council.

Mr. CARLESS seconded Mr. Anthony's motion, and argued that if the gas-works were now in the hands of the company gas would not be supplied at the price stated. He thought it would be better to refer the matter back to the committee.

Mr. SHELLARD was inclined to support Mr. Garrold's motion, because the old gas company had been frequently told that their charge was extortionate, and that they must be realizing a very large profit. With the cost of the production of gas increased nearly 1s. 6d. per 1000, there could not be left a very large margin for profit. He knew a great deal about the coal question. He had travelled on the previous day from Durham, and a gentleman told him there that 16s. per ton was now paid at the pit's mouth for coal which six years ago was bought for 3s. 6d. It could not be expected that these fabulous prices would be maintained; and as the matter had received the careful attention of the committee, he did not see what the council had to be alarmed at.

Mr. JAMES said the proposition of Mr. Anthony placed the Town Council in a position of considerable difficulty, because they really did not know anything of the matter. The council treated the Gas Committee as they would treat a private company. The question put to the Gas Committee was at what price they would supply the public lamps, and they sent back their answer—£3 12s. 6d. He did not, therefore, see any ground on which he could alter his opinion. He acknowledged the great responsibility resting upon the shoulders of the Gas Committee, and the moral courage they had in meeting the difficulties caused by the present very high price of coals; but he did not doubt that the committee would make such a charge as would safely bring them home at the end of the year. He was bound to assume that gentlemen of such great experience, having offered to light the public lamps at £3 12s. 6d., would be able to meet the council at the end of the year. It was a matter for the Gas Committee to deal with; and he expected the offer made by them would be such a one as the council would have expected from a private company. If there were any error in the offer, it lay on the shoulders of the committee, and they must take the responsibility.

Mr. LLANWARNE said that if there was any reason to suppose the Gas Committee had made any financial mistake, it would be better that they should at once withdraw from the offer rather than go on to the end of the year, and then rectify it.

Mr. JAMES: If you put it in that way, it is quite another thing.

Mr. LLANWARNE: It is a new body. This is the first month they have been put into harness, and the work is new to them.

Mr. JAMES said that if a request were made by the Gas Committee to withdraw the offer, he was quite willing to assent.

Mr. LLANWARNE said that, looking at the price of coal, it might perhaps be injudicious for the committee to enter into such a contract; but he was not speaking on behalf of the whole of the committee, because he had not their authority. There was another subject for consideration, and that was the lighting of the lamps all the year round in the suburbs. He quite agreed with Mr. Anthony that all the lamps ought to be lighted, but, on the other side, there was the financial part of the question. There were no doubt difficulties to be met with in a financial point of view, and perhaps, as it occurred to him, there were some lamps which might be midnight lamps for four months in the year without being an injury or grievance to the outsiders. He thought it would be well to refer the report back to the committee to consider whether there were any suburban lamps which might be lighted for only part of the night during certain portions of the year.

Mr. GARROLD intimated his intention of moving a resolution laying down a principle as to lighting, without which nothing could be done.

Mr. ANTHONY was in favour of referring the matter back to the committee.

Mr. GARROLD maintained that the council should determine the principle of whether the whole or part of the lamps should be lighted all the year round.

Mr. ANTHONY, differing from the views of Mr. Shellard, maintained that the committee were not in a position to know the profits of a private company, but he did not believe that any company would make such a contract as this under present circumstances. His opinion was that if the contract were entered into it would be robbing one part of the city to pay another—in fact, robbing Peter to pay Paul. If the city could be lighted at the rate proposed, he was sure the council would have sufficient confidence in the committee to know that it would be done. If gas could be made at 1s. 6d. per 1000 less than its present cost of production, consequent on the high price of coal, there would be a large margin of profit; but, looking at the fact of the increased cost of production, and that the council had paid such an enormous sum for the goodwill of the works, he believed they could not do it. At the time that the Gas Committee made this arrangement, the manager had not informed them, and did not inform them until Monday last, that the increased price of coal would increase the cost of production 1s. 6d. per 1000; and he (Mr. A.) did not, therefore, see how the committee could make such a contract. Taking all these things into consideration, the better plan would be to refer the report back to the committee.

Mr. JAMES said the council had before them a report from the Gas Committee offering to light the lamps at a certain price. If the report were referred back, the committee might be influenced as to what lights they would have; and, therefore, the element of price and of lighting was very important to consider. If the committee were to consider the price of lighting, and the extent of lighting, let them have every facility for doing so—let them feel their way to the fullest extent. He thought the better plan would be to refer back both reports, and give the committee an opportunity of altering their decision if they should think it desirable to do so upon further consideration; but he thought it was desirable that the council should express an opinion, for the guidance of the committee, as to whether or not the whole of the lamps should be lighted all night. The present state of things was the result of various schemes which had been tried, but which had failed. They had tried the extreme, of doing without lamps, for two months in the year, and they had found that to be utterly objectionable. They had also tried the experiment of lighting only part of the lamps all night, and that had not given satisfaction. In order to lay down a principle, he proposed the following resolution, which had been drawn up by Mr. Garrold:—"That the reports of the Gas and Water Works Committee and the Gas Management Committee, so far as regards the lighting of public lamps, be referred back to those committees for reconsideration, and that those committees be directed to make arrangements for lighting all night such of the public lamps as are lit at all."

Mr. SHELLARD seconded the resolution.

Mr. GARROLD said he was not at all surprised that the council was somewhat diffident in lighting all the public lamps at the price named, but he should still vote—and state his reasons for doing so—for the adoption of that principle. The council, however, seemed to be of opinion that further consideration was required. At the proper time he should be ready to give reasons why he thought the Gas Committee could light the public lamps at a less price than they could supply private consumers. This was one of the advantages of the works being in the hands of the council. It was clear to him that there would be no loss. There must be a profit to keep up the interest and the instalments of repayments of principal; and he believed that the price asked was such as would, *per se*, yield that profit. He hoped the council would affirm the principle of lighting the whole of the lamps all night, and he believed that the greater part of the citizens would approve that decision.

Mr. RALPH said if he had been present at the meeting of the committee he should not have approved of the report, especially after the statement of Mr. Davies, the manager of the works, that the cost of the production of gas was increased 1s. 6d. per 1000. Mr. Garrold argued that they ought not to charge a profit on the public lamps; but he (Mr. R.) did not know that they were going to charge a profit, according to the calculation. It was quite clear that if the charge for public lamps was less than it ought to be, the private consumers must make up the difference. As to the lighting the whole of the lamps all the year round, he thought that was a matter which should be settled by discussion at a public meeting. From all the information he had gained, he had not heard a single person say there was any necessity for lighting the suburban lamps all night.

Mr. E. SMITH seconded the amendment.

Mr. SHELLARD said he could not see why they should refuse to light the suburban lamps all night all the year round when the lamps in the city were thus lighted. A far more plausible scheme, if it would answer public requirements, was that alternate lamps only should be lighted in the suburbs and throughout the city.

Mr. LLANWARNE said he did not see his way to vote for either proposition; but he maintained that under the principle of equality of rating the suburbs had as much right to be lighted as any other parts of the city.

Mr. JAMES wished to ask the gas manager to state what the effect would be of putting out a portion of the suburban lamps at midnight.

Mr. DAVIS replied that it would not answer financially to adopt such a plan.

Mr. COOKE wished to raise the point as to whether the lamps could not be dispensed with on the night of the full moon and the two preceding and following nights. He knew that was done in many places without inconvenience.

Mr. SHELLARD said that this plan had been tried, but in consequence of the uncertainty as to the natural light at the full of the moon, it had been unanimously resolved to abandon it.

The MAYOR, after condemning the recent experiment, which had left the city for two months in darkness, as being defective, stated that when the report as to the charge for public lamps was drawn up the committee had not received intimation as to the increased cost of production of gas, consequent on the advanced price of coal. He was strongly in favour of suburban residents being dealt with the same as those in the city, but thought that a discretionary power might be vested in the committee to deal with the matter generally. The council did not want to make a profit out of the public lamps, but they must take care and secure themselves so as to meet the responsibilities which they had undertaken.

Mr. CAM said that the question had been fully considered by the Gas and Water-Works Committee, and Mr. Davis had answered the questions which he had been asked. When the board had decided upon the principle of lighting, then a discretionary power might be given to the committee. The first question to be considered was what the Gas Lighting Committee could light the public lamps all night for; the next, whether the council could pay that sum.

Mr. CARLESS, as one who had for some time resided in the suburbs, approved the suggestion for lighting alternate lamps.

After some further discussion, the resolution proposed by Mr. James was put and carried unanimously.

The following report was read and adopted:—

Report of the Special Gas Committee.

Gentlemen,—The purchase of the gas-works having been completed, our duties have ceased, and we have only to report as to the application of the money borrowed. The sum lent by the Scottish Widows Insurance Fund was £55,000, out of which sum were made the following payments, viz:—

	£	s.	d.
C. G. Cleminshaw, engineer	31	3	0
Town-clerk, law charges	3	17	3
Mr. Baker, taking inventory	5	5	0
J. Walsh and Son, reporter's charges, &c., at the arbitration	6	2	3
Purchase-money for works, land, &c., as per umpire's award	51,665	0	0
Moiety of fees payable on the same	319	10	0
Purchase-money for plant, as per arbitrators award	680	0	0
Moiety of fees payable on the same	45	0	0
Finance clerk and other charges	10	17	6
Stamp duty on conveyance	258	10	0
Agent's charges	3	1	4
Farrer and Ouvry's bill of costs for loan	200	0	0
Town-clerk's bill for conveyance of works	75	16	4
Town-clerk's bill for mortgage of works	66	19	7
	£53,371	2	3

The total of these payments, £53,371 2s. 3d., is the cost of the works to the council. We have also made the following payments for trade stock and fittings:—

To Mr. Baker, for taking inventory of fittings, &c.	£6	6	0
To the gas company, for stock and fittings	360	0	0
To the gas company, for floating stock of coals, coke, lime, tar, stores, service-pipes, fitters shop, smiths shop, lamplighters room, &c.	520	0	0
	£886	6	0

Leaving in our hands a cash balance of £742 11s. 9d., and this sum we have handed over to the Gas Management Committee as a trade capital to enable them to carry on the works until their first quarter's receipts come in. When, therefore, the Gas Management Committee furnish their statement of accounts at the end of the year they will have to debit themselves with the three sums of £360, £520, and £742 11s. 9d., making a total working capital of £1622 12s. 5d. CHARLES ANTHONY, Chairman.

CAMBRIDGE WATER-WORKS COMPANY.

The Ordinary Half-Yearly Meeting of the Shareholders of the Cambridge University and Town Water-Works Company was held at the Office of the Company, Bene't Street, on Friday, Aug. 2—The Rev. Dr. OKES (President of King's College) in the chair.

The minutes of the preceding meeting were read and confirmed.

The following reports were presented:—

The Directors Report.

Your directors herewith transmit the statement of accounts for the past half year, which have been duly audited. They propose a dividend on the consolidated stock and new shares for the half year ending July 6, 1872, at the rate of 6½ per cent. per annum, to be paid on the 31st of August next, free of income-tax. To meet this dividend the sum of £18 7s. 1d. will be appropriated from the suspense account.

Your directors desire to draw the attention of the shareholders to the increase in the cost of fuel. The high prices recently prevailing for the last half year almost universally have necessarily affected the accounts of the company. Should this increase continue, it will become a question with the directors whether the company's tariff must not be raised accordingly.

The item of rates has of late pressed with increased severity upon the company's income. Your directors have it in contemplation to apply for a re-hearing of their case, with the hope of obtaining a reduction in the assessment of the company's property in the Cambridge Union.

Although the ordinary water-rates are generally and steadily increasing, there is a serious falling off in the income derived from certain extraordinary water accounts. The diminished supply of water from the company's works to the Great Eastern Railway Company may be particularly specified as an instance of this.

The engineer and manager's report annexed shows the increase in the ordinary services.

The Cherryhinton estate, purchased from the executors of the late Mr. Okes, has been lately transferred to the company. A separate account is kept in respect thereof. When the costs of the enfranchisement, now in progress, of the copyhold portion of the estate have been ascertained, a balance-sheet exhibiting the total receipts and payments belonging to the transaction will be prepared for the inspection of the shareholders.

The directors are still of opinion that the purchase of this estate will prove very conducive to the welfare of the company, although the annual rents in money derived from it at present are not entirely equal to the interest payable upon the amount required for the purchase. They think that this deficiency is more than compensated by the relief obtained from the former restriction in the use of the spring, and by the consequently increased quantity of water which can now be applied to profitable purposes.

Your directors expect to secure by a moderate outlay upon the premises such an increase of rent for the house upon the estate, as will reduce the difference between receipt and expenditure to a mere nominal amount.

To provide for the balance due on the capital account for the extension of mains and other requirements, the directors propose to issue 3250 new shares of £2 each, and to make a call upon them of 10s. per share, to be payable on the 5th of October next.

For the purpose of authorizing the creation of these shares, the directors will convene an extraordinary meeting of the shareholders, to be held on the 16th of August next, at twelve o'clock at noon, of which due notice will be given. RICHD. OKES, Chairman.

Engineer and Manager's Report.

Gentlemen,—I have to report that during the past half year water from the company's works has been laid on to 188 premises, including Queen's College, the increased rental derivable from which is £134 per annum. The total number of premises now supplied is 5641. The general condition of the company's works continues satisfactory.

HENRY TOMLISON, Engineer and Manager.

Abstract of the Half Year's Accounts.

CAPITAL ACCOUNT UP TO JULY 6.

Dr.		*Cr.*	
Consolidated stock	£32,500 0 0	Amount expended to the 6th of January, 1872	£50,132 14 9
New shares (3250 at £3)	9,746 5 0	Mains and services	112 3 8
Loan	7,500 0 0		
	£49,746 5 0		
Balance	498 13 5		
	£50,244 18 5		£50,244 18 4

REVENUE ACCOUNT.

Dr.			*Cr.*		
Engine account	£99	8 8	Water-rates (less allowances)	£2,289	14 0
Fuel	250	16 1	Water account (sundries)	184	17 2
Wages, salaries, and repairs	279	16 1	Fittings account	109	8 9
Rents	42	15 0	Rents	25	10 0
Rates and taxes	273	1 11	Transfer fees	2	15 0
Incidental expenses	9	16 6	Improvement commissioners interest	14	3 6
Banker's commission and interest	17	3 5	Interest paid on calls in arrear	0	13 1
Printing and stationery	30	5 11		£2,627	1 6
Directors fees	79	10 0			
Secretary's salary	39	7 6			
Auditor's salary	5	5 0			
	£1,127	6 1	Balance brought down	£1,354	15 5
Interest on loan	145	0 0	Balance, Jan. 6, 1872 £1,490 17 0		
	£1,272	6 1	Amount from suspense account 25 19 8		
*Balance	1,354	15 5	£1,516 16 8		
			Less dividend to Jan. 6, '72 £1,516 16 8		
				0	0 0
	£2,627	1 6		£1,354	15 5

* See the directors report as to the Cherryhinton estate.

GENERAL BALANCE.

Dr.		*Cr.*	
Revenue account	£1,354 15 5	Capital account	£498 13 5
Banker's balance	506 0 0	Manager's balance	54 6 2
Unpaid dividends	16 8 1	Water-rates owing	1,177 3 0
Suspense account	918 3 7	Water accounts (sundries) owing	224 17 5
Accounts owing by the company	527 19 11	Fitting accounts owing	511 3 2
		Stock in hand	307 18 4
		Rents	29 5 0
		Transfer fees	2 15 0
		Improvement commissioners interest	14 3 6
		Ditto (standpost account)	503 2 0
	£3,323 7 0		£3,323 7 0

The CHAIRMAN, in moving the adoption of the reports, said there could be little doubt that the directors would have had greater pleasure in presenting a different report, in one respect, with regard to the dividend proposed to be voted. The reasons which required the proposal of so small a dividend had been stated in the report; and there were two items to which the attention of the shareholders was particularly called. In the first place, there was the increase in the cost of fuel, which presented itself to the pockets and consideration of every householder, although it was only summer. The matter would have to be taken into serious consideration; indeed, the directors had already met and had something in view, but it seemed very unlikely that they would be able to adopt any plan which would be cheaper than the present. The other point was as to the water-rates. Any one going through the accounts, and noticing the expenditure in the matter of rates and the cost of labour in procuring the water, would see there was reason for saying that the expenditure was greater, and yet at the same time there was a serious falling off in certain extraordinary accounts. The Great Eastern Railway Company was one of these extraordinary accounts, and this supply had ceased. He (the chairman) would ask the shareholders to look at the receipts generally. They were getting into a sort of normal state, and in future the receipts of the company would be mainly produced by the supply to householders, which would be more permanent, and therefore might be more easily calculated as to value. An opinion was expressed in the report as to the Cherryhinton estate, which it was to be hoped would prove as profitable as was predicted. There had been considerable restrictions imposed upon the company heretofore in the use of the spring, and it was hoped that although the receipts were not equal to the charges, this would be counterbalanced in the power the company now possessed in the use of the water. The chairman then moved that the reports be received and entered on the minutes, and took the opportunity to express the great satisfaction felt in Mr. Tomlison and in the assiduous attention he gave to the interests of the company.

Mr. BROWNE seconded the motion, which was carried unanimously.

Dr. FAWCETT proposed a dividend of 6½ per cent. in accordance with the recommendation of the directors in their report. The dividend last year was at the rate of 7¼ per cent., and therefore if the tariff were raised, the consumer would see that he was not alone affected. The question of raising the tariff, however, was for the directors to deal with hereafter, but he understood that consumers occupying houses below £40 would not be affected by such rise.

Mr. DEATH seconded the motion. He was sure the shareholders had every confidence in the directors, but he was sorry the balance-sheet was not so good as on the last occasion. He thought it time a remedy for this should be applied, and he thought it could be done if persons would assist the company. He alluded to the rates and taxes, as to which he would engage to say that no commercial institution was taxed as was this company, and he concluded that there must be some mistake. The company would be right in pressing this matter upon the consideration of the Assessment Committee. Their rates and taxes (£273 1s. 11d.) were only £6 less than the charges for wages, salaries, and repairs. And as the water had all to be sent up by pumping, the increase in the cost of fuel was a matter of serious import. He did not see how the company could pay a dividend that was fair to the shareholders, unless the tariff were raised; and although he should be sorry to tax the town, he did not think the consumers would so much object to a trifling increase, so that the shareholders had a fair return for the money they had laid out in procuring such a supply of good water for their use.

Mr. GOTOBED thought the owners of large gardens paid too little for the water supply.

The CHAIRMAN said the directors had had that subject under consideration more than once; and they had not finished their consideration of it.

Mr. GOTOBED said the decrease in receipts was greater than would be accounted for by the loss of the Great Eastern Railway's custom. Was there anything beyond that?

Mr. DEATH here observed that a report was current in the town that the directors might have continued supplying the railway company if they thought proper. That was incorrect. There had been no communication with the Great Eastern Railway Company as to the supply of water.

The CHAIRMAN, in answer to Mr. Gotobed, said the receipts from the Great Eastern Railway Company amounted to upwards of £600.

Mr. GOTOBED: Then that accounts for the deficiency.

A vote of thanks to the chairman was proposed by Mr. GOTOBED, seconded by Mr. DENNIS, and carried unanimously.

The CHAIRMAN, in acknowledging the compliment, said the duty before him was but slight, but it was as clear as the water the company supplied. It was very little trouble to him, because he was supported by an able board of directors, and they had the great advantage of the services of their manager. There were, however, a few "breakers ahead," which he wished to see satisfactorily removed.

YORK WATER-WORKS COMPANY.

The Half-Yearly Meeting of the Shareholders of the York Water-Works Company was held on Thursday, the 1st inst.—JOHN FRANCIS TAYLOR, Esq., in the chair.

Mr. WOOD read the report as follows:—

A statement of the accounts for the past half year is sent herewith, and the shareholders will be glad to observe that, notwithstanding the increased price of coal and other working expenses, the revenue of the company continues highly satisfactory. The directors have pleasure in reporting that the entire works of the company are in a very efficient state of repair. The call on the last issue of new shares has been paid up, and mortgages to the extent of such call—viz., £4000, have been paid off during the half year. The directors recommend that a dividend of 7s. per share upon the old shares and 1s. 9d. upon the new shares (last issue) for the past half year, being at the rate of £7 per centum per annum, be declared, and that the same be paid without deduction for income-tax on and after the 6th day of August inst. It is the painful duty of the directors to report the recent death of their chairman, John Craven, Esq., who for a period of 20 years has been a most able director of this company. The directors have elected John Francis Taylor, Esq., to be chairman of the board in the place of the late Mr. Craven.

The accounts exhibited the following results:—Half year's water-rents, £4575 2s. 8d.; property rents, £17 4s. 6d.; discounts and interest, £15 6s. 1d.; sale of fittings, £306 19s. 11d. The expenditure was as follows: Salaries and wages, £420 16s. 10d.; coals and gas, £328 2s.; oil, tallow, &c., £49 14s. 2d.; rates and taxes, including income-tax, £250 17s. 2d.; stationery, £18 19s. 9d.; direction, £150; auditors, £2 2s.; legal and sundry expenses, £24 2s. 5d.; repairs of engines, £78 3s. 7d.; ditto and cleaning reservoirs, £153 11s.; repairs of mains and works, £164 7s. 7d.; new mains, £28 2s. 2d.; interest on loans, £297 16s. 1d.; banker's commission, £11 7s. 6d. The balance in hand for dividend and working expenses is £3699 6s. 6d.

The CHAIRMAN said he appeared before them to preside under melancholy circumstances. They were all aware that in the death of Mr. Craven they had lost a man of stern integrity and unflinching honesty, and he possessed vast experience in the conduct of public works, his opinion being one upon which they could rely at all times, and his services were of extreme value to the company. For 20 years Mr. Craven had filled the office of director, and his sudden death had cast a gloom over the board, as his loss would be severely felt. The report alluded to the efficient state of the works, and he was glad in being able to say they were in that condition. The company had been put to expense in the relaying of those mains which were too near the surface, and which were so easily affected by the frost in winter, and thus trouble, inconvenience, and unnecessary expense were avoided. At the last severe storm a few winters ago trouble and annoyance were felt on account of the water being frozen, but this he hoped would to a considerable extent be avoided in the future. The company had a constant and plentiful supply of water for the city, sufficient to satisfy every demand. He had to congratulate the citizens upon the unlimited supplies of good and wholesome water, cor-

tainly not surpassed by other towns in the county of York and in other parts; and as Mr. Wood reminded him not in the metropolis itself.

The report was then adopted.

The CHAIRMAN moved the dividend resolution as set forth in the report.

Mr. W. PHILLIPS seconded the resolution, and it was agreed to unanimously.

Mr. W. C. ANDERSON, in moving a vote of thanks to the chairman and directors for the excellent manner in which they had conducted the business of the company, said the gentlemen who sat at the board were men of thorough business habits, and from their long experience and by their managing matters so well, the shareholders could look confidently forward to a permanent dividend of a satisfactory character. Persons were induced to embark their money in the company, not as a speculation merely, but with the view of a permanent investment, in which a fair dividend might be reckoned upon as a matter of certainty, dividends which would never be lower, but which would go on gradually increasing. The company enjoyed that confidence with the public that its shares were cent. per cent. premium, although its interest was not more than 7 per cent. He hoped that the present directors would long remain in office to conduct the concerns of the company in the satisfactory manner they had hitherto done.

Mr. J. DYSON seconded the motion, which was supported by Mr. W. PHILLIPS, and adopted unanimously.

The CHAIRMAN said he had much pleasure in acknowledging the kind vote of thanks just passed, and for that renewed mark of the confidence of the shareholders. He assured them that the directors would still continue to watch over the interests of the company with the same amount of zeal as before, and devote all the attention to their duties that was required at their hands. He felt that he was a feeble successor to the late Mr. Craven, but, having been placed in his present position, he should do his best to promote the welfare and prosperity of the company. He hoped that their present prosperity would long continue, that the dividend now paid would be maintained, and that at some future time the directors would be enabled to increase it.

METROPOLITAN BOARD OF WORKS.

The Ordinary Weekly Meeting of the Board was held on Friday last—Colonel HOGG, M.P., presiding.

The CLERK read a letter from the gas referees, enclosing an order fixing the maximum quantity of sulphur to be allowed in the Beckton and Bow works of The Gaslight and Coke Company, after the 1st of October next, at 15 grains per 100 cubic feet; enclosing letters from the Imperial and South Metropolitan Gas Companies, protesting against the proposal of the referees to fix the maximum amount of sulphur to be allowed in the gas of those companies at 30 grains per 100 feet; and stating that, as there are at present no known means of uniformly keeping the quantity of sulphur below 30 grains, except in works where lime can be freely used, the referees postpone fixing a maximum to be observed in works other than those at Beckton and Bow.

On the suggestion of the CHAIRMAN, the letter was referred to the Works and General Purposes Committee for consideration and report.

The Works and General Purposes Committee reported, *inter alia*, as follows:—

"Your committee have to report that they have considered the letter from the Board of Trade, intimating their intention to make some change in the appointment and duties of the gas referees after the 1st of September next, the letter from the referees stating, with reference to the decision of the Board of Trade, that they will no longer be in a position to supply or certify the apparatus at the testing-places; and the letter from Mr. M. J. Salter, gas examiner at Dalston, stating that the gas referees have informed him that they can no longer supply the necessary chemicals, and asking what course he should adopt; the said letters having all been referred to your committee on the 3rd ultimo. From the explanations given by the Board of Trade in their letter, it would appear that the alteration which they propose to make will involve no departure from the provisions of the Acts of Parliament regulating the constitution and duties of gas referees. There was, however, one difficulty which presented itself, and it was this. The referees have from the first been in the habit of supplying the test solutions and other chemicals used by the gas examiners in testing the gas. This duty is not specifically imposed upon the referees by the Acts of Parliament, but in supplying the chemicals, they have probably been carrying into effect in the best and most practicable way the general intention and object of the statutes. And the course adopted has had this advantage that the same standard test solutions, &c., have been supplied to all the examiners by an authority occupying an independent position between the gas companies and the local authorities representing the consumers. The new arrangement proposed by the Board of Trade would, it appeared to your committee, prevent the continuance of this convenient mode of proceeding. The sub-committee to whom your committee referred the subject, accordingly requested Mr. Keates, the board's superintending gas examiner, to see the secretary of the Board of Trade, and endeavour to arrange some means by which this difficulty could be obviated. Mr. Keats has seen Mr. Farrer twice, and he has undertaken that when the appointment of referees takes place upon the new footing, arrangements shall be made for continuing the supply of the test solutions and chemicals to the gas examiners. This object being secured, it does not appear to your committee that the new arrangement as to the referees will in any way adversely affect the position or interests of the consumers of gas in the metropolis."

The CHAIRMAN said he had had a conversation with Mr. Keates, and he had no doubt the board would approve the step he had taken in authorizing that gentleman to carry out any arrangements which he might think necessary in consequence of the proposed change as to the appointment of gas referees.

The report was approved.

The CLERK laid before the board an order from the gas referees, reducing the ammonia maximum for the Pimlico works of The Gaslight and Coke Company to 2½ grains per 100 cubic feet of gas from the 1st of October next.

The Parliamentary Committee presented a report containing a review of the course taken by the board with reference to the various measures affecting the metropolis which were under the consideration of Parliament during the session, from which the following are extracts:—

"*Public Health Bill.*

"This bill was introduced by Her Majesty's Government with a view to rendering more effective the law relating to the public health, and, for that purpose, the bill provides for the constitution of sanitary authorities in all places where such do not already exist. It contains provisions relating to water supply, the discharge of sewage into streams, and many other matters. The bill is not to apply to the metropolis, except in so far as specially provided, and the only special provision for this purpose relates to the constitution of a sanitary authority for the port of London. There was originally a blank in the bill for the name of the sanitary authority, the Government not being prepared with any proposition on the subject. The board at first took the view that, as this was a matter which intimately concerned the health of the whole metropolis, and, as the expenses connected with the execution of the duty would probably have to be defrayed by means of a rate over the metropolis, the sanitary authority over the port of London should be some central body representing the same area. It was accordingly suggested that this board should properly be constituted the authority for the purpose. Subsequently, the question was taken up by the Corporation of the City of London, who offered to undertake the duty if Parliament should see fit to entrust it to them, and to defray the cost out of their own revenues. Immediately on this proposal coming to the knowledge of the board, they hastened to withdraw their own suggestion, which was only made on the supposition that the metropolis would have to bear the cost of the measures taken, in which case it would, of course, have been necessary that some body representing the whole metropolis should have been entrusted with the administration of the funds levied for the purpose. The board gladly recognized this additional evidence of public spirit on the part of the Corporation of the City of London, and there can be no doubt that the duty which the corporation have undertaken will be energetically and efficiently discharged.

"On the motion of Mr. Kay-Shuttleworth a clause has lately been inserted in the bill, transferring to the Local Government Board the duties entrusted to the Board of Trade by the Metropolis Water Act, 1871. Looking to the general scope of the respective functions of these two departments of the Government, the duty of supervising the metropolitan water supply would appear to pertain more properly to the Local Government Board than to the Board of Trade.

"The bill has passed the House of Commons, and is now awaiting its third reading in the House of Lords.

"*Petroleum Bill.*

"When the Petroleum Act of 1871 was originally introduced into Parliament as a bill, it provided for the testing of the petroleum in a closed (instead of an open) vessel, the only way in which accurate and certain results can be obtained, and fixed 85 degrees of Fahrenheit's thermometer as the temperature below which any petroleum giving off an inflammable vapour in a closed vessel should be considered dangerous, and should only be kept or sold under certain necessary restrictions. The Petroleum Association, representing the trade, opposed the standard of 85 degrees as too high, and suggested 80 degrees as a fair standard. The board, however, considered the higher figure necessary, in the interests of the public safety. There being this conflict of opinion, and the session drawing to a close, the new schedule prescribing the improved mode of testing was withdrawn, and the old schedule of the Act of 1868 prescribing the testing in an open vessel and a standard of 100 degrees was inserted. This year a bill was introduced, on behalf of the Home Office, into the House of Lords, providing for the close test and a standard of 85 degrees. The subject was investigated by a select committee of the House of Lords, before whom the board produced evidence in favour of the higher standard, the representatives of the trade again opposing it. The committee adopted 82 degrees as a fair compromise between the conflicting views; and the bill, with that figure inserted, was passed and sent to the House of Commons. It would seem that the representatives of the trade intended here to renew their opposition to the bill, as the Home Secretary has, within the last few days, announced that, considering the opposition which was offered to the proposed standard, and that the Government did not deem it consistent with the interests of the public to consent to any further reduction, the bill would, at this advanced period of the session, be withdrawn. Your committee regret that another year will have passed without the law relating to petroleum being placed on a satisfactory footing, and can only express the hope that the investigation which the subject has undergone this year by the House of Lords Committee will have prepared the way for the settlement of the question next session.

"*Southwark and Vauxhall Water Company's Bill.*

"The company applied for power to raise additional share capital to the amount of £400,000, and to borrow an additional £100,000, and no limit was fixed to the amount of dividend or interest. The 75th section of the Water-Works Clauses Act, 1847, authorizes a maximum dividend of 10 per cent. on the shares of water companies' undertakings where no other maximum is fixed. It appeared to the board that the holders of the proposed additional capital should receive a lower rate than 10 per cent., and as the Legislature have in recent years restricted in certain cases the amount of dividend to be paid to shareholders in gas undertakings, the board petitioned the House of Commons that the Southwark and Vauxhall Water Company might be restricted, as regards the new capital, to something less than 10 per cent. It appearing in the course of the inquiry that the company had never paid a higher dividend than 6½ per cent., the select committee declined to impose any limit other than the general one contained in the Water-Works Clauses Act, and the board under the circumstances thought it unnecessary to proceed any further in the matter.

"*South London Gas Bill.*

"The object of this bill was the amalgamation of the Phœnix and South Metropolitan Gas Companies, the two largest gas companies on the south side of the Thames. The board have generally advocated amalgamation amongst gas companies as calculated to produce economy in administration and in the manufacture and distribution of gas, and thus to be favourable to consumers. The latter is, of course, the test by which any amalgamation scheme would be judged by the board, as representing the public. The conditions upon which it was sought to effect the amalgamation of the two companies here referred to were not, in the opinion of the board, such as the public had a right to expect, and they accordingly opposed the bill. Opposition was also offered to it by other parties immediately concerned, and the committee of the House of Commons, to whom it was referred, having expressed the opinion that in the scheme the interests of the public had not been sufficiently considered and provided for, the bill was withdrawn.

"*The Gaslight and Coke Company's Bill.*

The company, finding it necessary to increase their new works at Beckton, near Barking, applied to Parliament for power to raise additional share capital to the amount of £1,000,000, and to borrow to the extent of one-fourth of such additional capital. Under the Gas-Works Clauses Act, 1847, this additional share capital would, unless there were a special provision to the contrary, bear a dividend of 10 per cent. Inasmuch as the £10 shares of the company were quoted at between £16 and £17, the board were of opinion that the new capital should be raised at a lower rate than 10 per cent., as otherwise the effect would be to secure the payment of large bonus to the existing shareholders, and the price of gas would be maintained at an unnecessarily high figure. The board accordingly appeared before the committee of the House of Commons, and urged that a maximum dividend of 7 per cent. should be fixed, as had been done in the case of the Imperial Gas Company in 1869. The committee, however, declined to adopt the course suggested by the board, and a subsequent appeal to a committee of the House of Lords met with a similar result. The bill was accordingly passed, without any limit to the rate of dividend other than that prescribed by the Gas-Works Clauses Act.

"*Water Supply Regulations.*

"This question, although not in the form of a bill before Parliament, having been under the consideration of the committee during the past few months, they have thought it well to make some allusion to it in this report. The Metropolis Water Act of 1871 required the water companies, within six months from the passing of the Act, to make regulations to be observed by consumers in connexion with a constant supply of water, and to submit the same to the Board of Trade for confirmation. The Act further required that the regulations should be sent to this board, and that the latter should, if they desired, be heard by the Board of Trade before the regulations were confirmed. In February last the regulations were made by the companies and copies forwarded to the board, as required by the Act. They were carefully examined, and the result was to convince the board that they were calculated to cause so much expense, trouble, and vexation to consumers, as practically to render the constant supply, subject to such regulations, worse than the present system. After full consideration, the board were of opinion that the most convenient course would be for them to prepare, and submit to the Board of

Trade, a series of counter-regulations calculated to effect the object in view in the least inconvenient and costly mode, and at the same time with due consideration for the companies interests. This they accordingly did. The Duke of Richmond, with Mr. Rawlinson and Captain Tyler as assessors, undertook, at the request of the Board of Trade, to conduct the inquiry; but, at the first sitting, a question was raised as to the power of the Board of Trade, under the Act, to delegate the inquiry. The law officers of the Crown having been consulted, it was thought advisable to apply to Parliament for a short Act declaring that inquiries to be made by the Board of Trade might be legally made by persons duly appointed for the purpose by that board. An Act to this effect was passed, and, the Duke of Richmond being then unable to undertake the inquiry, Lord Methuen, Mr. Rawlinson, and Captain Tyler were appointed. The inquiry has been proceeding up to the present time, the companies on the one hand, and the board and the City Corporation on the other, being represented before the commission by council. The commissioners will probably in a few days have completed the inquiry, and be in a position to report their conclusions to the Board of Trade, and it will then remain for the Board of Trade to declare what regulations are to be observed."

ON SULPHIDE OF CARBON.

A Lecture delivered before the British Association of Gas Managers, on Tuesday, June 11,

By Dr. ODLING.

Sulphide of carbon, although a very minute constituent of coal gas, can scarcely be regarded as an unimportant constituent; at any rate, if we bear in mind the large degree of importance so commonly attached to it. I propose to consider with you this evening, the properties of this sulphide of carbon, and more particularly the circumstances under which it is formed, and the circumstances under which it is decomposed, with a view to your making use of the information I hope to put before you, by giving it some practical application. It is known to us all that when coal is heated in a retort, as in the manufacture of gas, a large proportion of the weight or substance of the coal is resolved into volatile products of different kinds. Of these products, the least volatile become condensed into tar, the intermediate into ammoniacal liquor, while only the most volatile or least condensable remain in the form of permanent gas. And this permanent gas is found to be composed mainly of the three elementary bodies—namely hydrogen, carbon, and oxygen—which together constitute the great mass of the organic, or organically derived, substance, coal.

It is an interesting point, in the consideration of the action of heat upon coal, to observe that in the produced gas, each of the three principal constituents of the coal appears in almost as many gaseous forms as it is possible for it to appear in. We find that the hydrogen of the coal appears largely in the state of free hydrogen gas, so as to constitute indeed not unfrequently one-half of the bulk or volume of the permanent gas. Then we have a portion of hydrogen combined with oxygen in the form of aqueous vapour, and another portion combined with nitrogen in the form of ammonia; while by far the largest proportion by weight of the hydrogen occurs in combination with carbon, in the form of different gaseous or vaporous hydrocarbons. Similarly in the case of oxygen, a portion appears united with hydrogen in the form of water; another portion appears united with carbon, so as to form the carbonic acid gas, removed in great measure from the illuminating gas before its delivery; while a third portion appears also united with carbon, but in the form of carbonous oxide gas, which remains as one of the inflammable constituents of the gas delivered to consumers. So again with regard to the carbon of the coal, it occurs among the volatile products of the distillation partly in the oxidized forms of carbonic acid and carbonous oxide, and very largely in the form of different more or less luminiferous hydrocarbons. At present we can only take cognizance of the fact that the gaseous products of the distillation of coal have this multiform character. A far more intimate knowledge than we at present possess would be required to enable us to explain the conditions under which the different products, in their different relative quantities, are produced.

A point of much interest with regard to the carbon products of coal distillation is their great degree of volatility. Carbon in the uncombined form is especially characterized by its infusibility and fixity in the fire. We cannot even melt it, still less can we volatilize it. In this respect it differs from the greater number of elementary bodies with which chemists are acquainted, and from a large proportion of compound bodies. As a rule, if we take any definite chemical substance and apply an increasing heat to it, one of two things happens—either it ceases to be the substance it originally was, that is to say, it undergoes a chemical change into new products, or, remaining the same substance, it melts, and at a still higher degree of temperature, it boils; and very few indeed of the large number of substances known to chemists are capable of resisting such processes of heating as are now available, without on the one hand, undergoing decomposition, or, on the other hand, undergoing fusion or volatilization. And this property of volatility is possessed by elementary bodies and by bodies of simple constitution, to a greater extent than is generally supposed. A piece of silver, for instance, may not only be melted as a piece of ice is melted, but at a far higher temperature, indeed, it may be boiled as water is boiled; and just as in laboratories, when we require pure water, we have recourse to distilled water, so also when we require absolutely pure silver we have recourse to distilled silver. But in respect of its fixity, or non-volatility, carbon or charcoal is a most remarkable substance. So long as it continues chemically unchanged, heat it as strongly as we can, we are incapable of fusing or volatilizing it. But cause it to enter into chemical union with some other element—with oxygen, or hydrogen, or nitrogen, or chlorine, or sulphur—and we obtain compounds of which the most characteristic property is their volatility. And to such a degree, indeed, is this the case, that out of the only three compound gases known to chemists which have never been reduced to the unvolatilized or liquid state, two of them—namely, carbonous oxide CO, and marsh-gas CH_4—are compounds of carbon.

I want now to direct your attention to the circumstances under which some of these volatile compounds of carbon are produced—not indeed during the distillation of coal in gas-retorts, by virtue of complex reactions which have been but very imperfectly studied—but to the circumstances under which they are produced by the direct combination of their constituent elements. And, in particular, I want to consider with you the conditions under which carbon enters into union with oxygen on the one hand, and with hydrogen on the other hand, in order that we may afterwards study with advantage the conditions under which it unites with sulphur to form disulphide of carbon. In respect, then, of its union with oxygen, charcoal or carbon, especially in its looser forms of aggregation, is remarkable for the low temperature at which it takes fire and burns. Here is some crushed wood charcoal gently heated in a porcelain dish, standing at some distance above a small Argand gas-flame; and you observe that the charcoal in the dish is glowing hot—not made glowing hot by the small gas-flame, but made hot enough to take fire of itself, and so to become and continue glowing hot. If I blow a current of air on it, it burns with greater vivacity; and if I now blow on it a current of oxygen, it burns, you observe, with very great brilliancy indeed, and with development of a very high degree of temperature. Now whether this charcoal burns at a high or at a comparatively low temperature, provided it has a sufficient quantity of air or oxygen with which to combine, it always burns into the same product, namely, carbonic acid gas; and the act of burning is an evidence to us of the chemical combination taking place between the carbon and the oxygen of the air, to furnish the carbonic acid.

You well understand that for the heated charcoal to continue burning, one essential condition is involved, namely, that the amount of heat given out of the burning tending to keep the charcoal hot, shall exceed the amount of heat dissipated by radiation and contact with the surrounding air tending to make the charcoal cold. A piece of red hot iron held in the air quickly becomes cold, and a piece of red hot charcoal is subjected to the same cooling influences; which are, however, counteracted to some extent by the amount of heat given out, in this latter case, by the burning of the charcoal. In a charcoal fire, then, where each piece of charcoal receives heat from its neighbour in exchange for what it yields thereto, we have continuous burning; but a solitary piece of burning charcoal soon goes out, the amount of cooling it experiences by radiation and contact with the cold air being in excess of the heating it experiences as a result of its combination with the air.

So much, then, for the continuous combination of carbon with oxygen to form carbonic acid. But there is another compound of carbon with oxygen, namely, carbonous oxide, to which we must devote a few moments consideration. It would appear that this last compound is never produced directly from air or oxygen, but only through the intervention of carbonic acid. With carbon burning either quickly or slowly, at a high or at a low temperature, carbonic acid is the first product furnished; and when this so produced carbonic acid further passes through a mass of strongly-ignited fuel, as commonly happens in a briskly-burning coke fire, it takes up more carbon and is thereby reduced to the state of carbonous oxide CO, which burns with its characteristic blue flame on the surface of the fuel:

$$CO_2 + C = 2CO.$$

Now whereas hydrogen in the free state, occurs among the constituents of coal gas, the nearest approach to free carbon that we meet with is this carbonous oxide, or, so to speak, half-burnt carbon; and it is noteworthy that, in the act of burning, these two inflammable gases alike unite with half their bulk of oxygen, and by their oxidation evolve substantially the same amount of heat:

$$H_2 + O = H_2O; \quad CO + O = CO_2.$$

Having thus remarked upon the combination of carbon with oxygen, we have next to consider its combination with hydrogen. If we take a piece of carbon of any kind, and, having heated it very intensely, introduce it into a vessel of hydrogen, the ignited carbon enters into combination with the hydrogen, though far less actively than it would with oxygen; and inasmuch as, by its combination with the one gas as well as with the other, a certain amount of heat is given out, we may say, if we like, that the carbon burns in the hydrogen as in the oxygen. But there is this important difference, that whereas the amount of heat given out by the union of the ignited carbon with oxygen is very great, the amount of heat given out by the union of the ignited carbon with hydrogen is so small as to be scarcely appreciable, or rather to be inappreciable except as a matter of inference. Hence it results that if we burn some ignited charcoal in hydrogen, the amount of heat evolved by its combination with the hydrogen will nothing like suffice to retain it at the temperature requisite for its combination, whence all action whatever will quickly cease, and the charcoal become extinguished or go out. The only way then for us to effect the combination of carbon with hydrogen, is for us not only to make the charcoal intensely hot, but further to keep it hot; as we are enabled to keep it by means of a powerful voltaic current. When kept in this way intensely hot, it enters into combination with the surrounding hydrogen, undergoing a sort of slow burning in the hydrogen. With regard to the products formed by the direct union of carbon with hydrogen, it would appear that the compound produced in the first instance is the primary hydrocarbon, marsh gas CH_4, although indeed this has not been proved to demonstration. But among the compounds actually met with is acetylene C_2H_2, a well-known product of the decomposition of marsh gas by heat. This acetylene is an important luminiferous constituent of ordinary coal gas, and is indeed the most luminiferous of its truly gaseous constituents. But acetylene, when submitted to a high temperature, has itself the property of undergoing a further change, and of being transformed into a volatile liquid, benzole, composed of carbon and hydrogen united in the same proportion as in acetylene:

$$3\,C_2H_2 = C_6H_6.$$

Accordingly, when passed through a red-hot tube or otherwise strongly heated, gaseous acetylene becomes largely transformed into condensable benzole, a body, by virtue of its condensability, of far less value than acetylene as a constituent of coal gas, and deposited in large measure from the gas, so as to become a constituent of the tar.

A word or two with regard to the combustion or burning of the hydrocarbons in air or oxygen. We have seen that when hydrogen and carbonous oxide burn, they simply enter into union with oxygen to form each a single oxidized product; but in the case of the hydrocarbons, two oxidized products are furnished, or the constituents of the hydrocarbon undergo a simultaneous separation from each other and combination each with oxygen, thus:

$$CH_4 + O_4 = CO_2 + 2H_2O.$$

In the combustion, then, of the hydrocarbons, we have a balance of the two actions, combination and decomposition—that is to say, we have a small cooling effect consequent on the separation of the carbon and hydrogen from each other, and a largely preponderating heating effect consequent on the union of the separated carbon and hydrogen with oxygen. Thus, you perceive, the burning of the hydrocarbons is a phenomenon of a somewhat different nature from the burning of the simpler constituents of coal gas that we have previously referred to.

We now proceed to discuss the combination of carbon with sulphur, and to consider the nature of the product furnished by the combination. You know that chemists are in the habit of associating together sulphur, hydrogen, carbon, and the metals, as belonging to the class of combustible bodies, whereas oxygen is referred to the opposite class of empyreal or combustion-supporting bodies. But we shall find that hydrogen, carbon, and the metals are capable of burning in sulphur as in oxygen; and that although with respect to oxygen, sulphur is a combustible body, with respect to hydrogen and carbon it is truly a combustion-supporting or empyreal body. And, indeed, notwithstanding that sulphur is an opaque yellow solid and oxygen a colourless invisible gas, there is more of real analogy between these two elements than subsists between hydrogen, carbon, and the metals; and to such an extent does the analogy prevail, that by far the great majority of oxidized compounds are capable of being represented by similarly constituted and characterized sulphurized compounds. Thus, sulphuretted hydrogen H_2S, is only a sulphurized representative of water H_2O, and sulphide of carbon CS_2, a sulphur representative of carbonic acid CO_2. No sulphur compound, indeed, corresponding to carbonous oxide has hitherto been produced; but the existence of an oxisulphide of carbon, intermediate between sulphide of carbon and carbonic acid, seems to be well established:

$$CS_2; \quad COS; \quad CO_2.$$

Sulphur, when heated out of access of air, melts at about 239° Fahr., and boils at 836° Fahr., yielding a heavy orange-red vapour. Hydrogen and many of the metals burn in this vapour, under conditions similar to those under which they burn in oxygen; although, indeed, the combustion of the metals, and more particularly of iron, does not take place readily unless they are either in a fine state of division, or at an exceedingly high temperature. Thus, while sulphur is habitually distilled from heated iron pots, a strongly heated

iron poker will burn in sulphur vapour as readily, and with almost as much brilliancy, as in oxygen gas. With regard to carbon, if we take a piece of carbon or charcoal, and having made it red hot, introduce it into a vessel of sulphur vapour, the charcoal enters into combination with the sulphur, and as a result of the combination, an appreciable amount of heat is evolved; but the amount of heat evolved is quite insufficient to maintain the charcoal at the temperature requisite for the combination or combustion to go on, and the action accordingly soon comes to an end. It is only when the charcoal, having been heated to bright redness, is kept at the temperature of bright redness by external means, that its combination with the sulphur vapour is continuous. Hence the method adopted for the commercial production of sulphide of carbon—and it is now produced on an extensive manufacturing scale—consists in passing the vapour of sulphur over ordinary coke kept strongly heated in fire-clay cylinders. With regard to the occurrence of sulphide of carbon as a constituent of coal gas, supposing the sulphur of the coal actually existed in the state of free sulphur, it is doubtful whether at any stage of the distillation, the conditions necessary for the production of sulphide of carbon would prevail. If formed at all in the early stages of the distillation, it would be in the presence of other compounds, with which it speedily undergoes double decomposition. And so long as the temperature of the interior of the retorts is appreciably kept down by the continuance of the distillation, a sufficient degree of temperature to allow of the carbon and free sulphur entering into combination with each other, could hardly be reached. And independently of this, the sulphur would be distilled off with the other volatile products of the coal, long before the high degree of temperature necessary for its conversion into sulphide of carbon could be attained. You will remember that the temperature at which sulphur boils is 836° Fahr. Now, the temperature of a dull red heat, just visible in the dark, is usually put down at 1000° Fahr. But for carbon to enter freely into combination with sulphur vapour, a temperature falling not far short of 1500° or 1600° would probably be required. So that if the sulphur of coal existed simply in the form of free volatilizable sulphur, very little risk of the formation of sulphide of carbon would be incurred in the process of gas manufacture. And the smallness of the risk may be illustrated in this way:—If you take a mixture of sulphur and of carbon, in the form either of coke or charcoal, and heat the mixture in any suitable vessel, you will find the sulphur distil off, and the carbon be left behind unacted on.

But, as a matter of fact, the sulphur of coal does not exist in the form of free volatilizable sulphur, but chiefly in the form of the fixed mineral substance, iron pyrites. Now, iron pyrites, though troublesome to gas-makers as a constituent of coal, is by itself a very important and valuable material—so much so indeed, that during the year 1871 there were nearly half a million tons of it consumed in this country for the production of sulphuric acid or oil of vitriol, in its various forms. Iron pyrites is a combination of iron with sulphur. When used for manufacturing purposes, it is simply set fire to. Like gas-carbon or hard coke, a single piece of it does not burn very readily, but in large quantities it forms by itself a very good fuel. Its sulphur burns into sulphurous acid, which is conveyed by suitable flues into large leaden chambers, wherein it is converted into sulphuric acid; and its iron burns into a residue of iron oxide, which is now-a-days further treated, so as to yield a variety of valuable products.

But the point we have specially to consider is not so much what happens when pyrites is heated in a draught of air so as to burn, but what happens when the pyrites is heated strongly in close vessels, either alone or in contact with carbon. Now, iron pyrites by itself, will stand a very considerable degree of heat without undergoing any obvious change. But at a full red heat it melts, and at a little higher temperature it gives off one-third of its constituent sulphur, so as to leave a residue having the composition of magnetic pyrites. Iron pyrites being constituted of one proportion or 56 parts by weight of iron, and two proportions or 64 parts by weight of sulphur, every 100 lbs. weight of pyrites evolves at a full red heat 21 lbs. of sulphur, and that under conditions most favourable for its entering into combination with carbon:

$$3FeS_2 = Fe_3O_4 + S_2.$$

But even this is not all; for at a full red heat, the pyrites melts and sinks into the porous coke, for instance, with which it may be in contact; so that we have to consider not merely the effect of a strong heat upon pyrites, but its effect upon an intimate mixture of pyrites and carbon. And in this case, the pyrites gives off not merely one-third but one-half of its sulphur, so as to leave a residue of protosulphide of iron, thus:

$$2FeS_2 + C = 2FeS + CS_2.$$

Indeed, instead of strongly heating carbon in an atmosphere of sulphur vapour, a very good laboratory process for producing sulphide of carbon consists in heating strongly a mixture of pyrites and carbon. The protosulphide of iron resulting from the reaction is a common constituent of ordinary gas coke, and it is to the presence of this constituent that the evolution of some sulphuretted hydrogen, on quenching the strongly-ignited coke with water, is due. I do not call to mind any precise experiments upon the subject, but there is, I believe, little doubt that the chief proportion of sulphide of carbon found in coal gas, is produced in the later stages of the distillation. Doubtless, also, it is produced in the manner I have just explained, by a reaction of the pyrites with the first formed and most strongly heated coke.

We have next to consider the properties of sulphide of carbon. In the first place it is a combustible body, and burns with a characteristic blue flame. Its burning, like that of the hydrocarbons, is a complex phenomenon. We have a simultaneous separation of the carbon and sulphur from each other, and an oxidation of them into carbonic acid and sulphurous acid gases respectively; or each constituent yields the same burnt product that it would yield if burnt by itself in the free state:

$$CS_2 + O_6 = CO_2 + 2SO_2.$$

When, however, the supply of air is insufficient, a portion of the sulphur escapes being burnt, and the reaction then takes place in this way:

$$CS_2 + O_4 = CO_2 + SO_2 + S.$$

But it is important to bear in mind that, however much air you may supply, or even if you substitute oxygen for air, the sulphur burns simply into the comparatively innocuous sulphurous acid SO_2—the strict chemical anologue of carbonic acid CO_2—and that to effect the conversion of this sulphurous acid into the far more objectionable sulphuric acid, a further and distinct operation is required.

Sulphide of carbon occurs as an exceedingly mobile liquid, devoid of any viscidity, and, when perfectly pure, is as colourless and transparent as water. As usually met with, however, it has more or less of a yellowish or brownish tint. It is a highly refractive and dispersive substance, and accordingly, when viewed in certain lights, is apt to exhibit a brilliant glow of prismatic colours. The extremely nauseous odour presented by most specimens of sulphide of carbon is consequent on their impurity. When thoroughly purified, sulphide of carbon, has a by no means unpleasant odour. Its proper smell, without indeed being quite so agreeable and fruity as that of chloroform, is very similar thereto. Here is a specimen of sulphide of carbon which, from its smell alone, might readily be taken for a specimen of chloroform. It is further a very heavy liquid, having a specific gravity of 1·27, and being consequently more than 1½ times as heavy as water, with which moreover it is immiscible; so that when I pour some sulphide of carbon into this tall cylinder of water it falls to the bottom as a distinct layer of liquid. Indeed it is only just sufficiently soluble in water to import a taste and smell thereto. But sulphide of carbon, though insoluble in water, is capable of mixing in all proportions with alcohol and ether. If I pour into this cylinder of alcohol some disulphide of carbon, the greater part of it disappears before reaching the bottom, and the whole of it disappears after a moment's agitation. This solubility of the disulphide in alcohol is taken advantage of by chemists when they wish to subject it to the action of chemical agents, and more particularly to the action of alkalis. If we take an aqueous solution of potash or ammonia, and agitate some disulphide of carbon therewith, the sulphide of carbon being insoluble in the water, is almost unaffected by the dissolved alkali, with which indeed it is scarcely brought into contact. But if instead of an aqueous we take an alcoholic solution of potash or ammonia, in which the disulphide dissolves readily, by the act of solution every particle of it is brought into contact with and acted on by the dissolved alkali. And indeed if alcohol were as little costly as water, we should find no great difficulty in dealing with the sulphide of carbon contained in our coal gas.

Independently of its power of mixing with or dissolving alcohol and ether, sulphide of carbon is a powerful solvent of various other inflammable highly carbonaceous bodies, as caoutchouc, resins, fats, essential oils, &c., and, indeed, it is chiefly on account of its solvent action on this class of bodies that it is now so largely manufactured. It has the further property of dissolving certain of the non-metallic elementary bodies, and more particularly iodine, sulphur, and phosphorus. On taking this stick of phosphorus, for instance, and introducing it into a narrow bottle of disulphide of carbon, you will see the stick of phosphorus disappear far more quickly than a stick of barley-sugar would disappear in water.

The solvent power of sulphide of carbon for iodine, giving rise to the production of a deep crimson or purple liquid, is also very characteristic. Here you perceive the splendid colour imparted to the disulphide by my adding a little iodine to it. It has, moreover, the power of removing iodine from its solution in water; so that if I add a little tincture of iodine to the water overlying the disulphide in this cylinder, and then agitate the entire contents, the iodine leaves the water to become dissolved in the sulphide of carbon, which accordingly acquires a bright pink colour; and this acquisition of a pink tint by sulphide of carbon, when agitated with an aqueous solution, constitutes a very delicate test for the presence of free iodine in the solution.

Sulphide of carbon has also a marked solvent action on sulphur; and only a few years back, it was conceived by some ingenious person that, inasmuch as sulphur was dissolved by liquid disulphide of carbon, disulphide of carbon vapour ought to be absorbed and retained by sulphur; and it was even proposed to free coal gas from sulphide of carbon by passing the gas over sulphur, that had been melted on crumpled wire, so as to expose a large surface to the gas. But it does not at all follow, because a solid substance is soluble in some particular liquid, nitre in water for example, that therefore the solid should be absorptive of the vapour of the liquid, as salt of tartar, for instance, is absorptive and retentive of moisture. As a matter of fact, sulphur is not absorptive of disulphide of carbon vapour; and, even if it were so, the process of passing coal gas over finely-divided sulphur is practised at all gas-works, where revived oxide of iron, charged necessarily with a greater or less proportion of sulphur, is used in the purifiers.

I now want to call your attention to some properties of disulphide of carbon, which are of importance in relation to our power, or rather want of power, of removing this impurity from coal gas. One of these properties is its extreme volatility. The boiling point of water being 212° Fahr., that of disulphide of carbon is 117° Fahr. only. Accordingly, on surrounding a flask of the disulphide with hot water, violent ebullition is set up; and the vapour rushing out from the mouth of the flask, takes fire on my bringing a light to it, and burns, as you perceive, with a characteristically blue flame. But a point of more interest to us than its low boiling point is its extreme volatility at ordinary temperatures. On dropping a small thin bulb of disulphide of carbon into this large bottle of air, and shaking up the bottle, the contained air becomes charged with the vapour of the disulphide, set free by the breaking of the bulb, to such an extent as to become readily and permanently inflammable. And I may associate this demonstration of the ready volatility of sulphide of carbon, with a demonstration also of the great weight of its vapour. Thus I am able to pour out the air, charged with sulphide of carbon vapour, into this iron tray, and there set fire to it. Here again I have an inclined wooden trough about eight feet long, and a beaker-glass containing some liquid sulphide of carbon. I incline the beaker a little, so as to allow the vapour it contains to flow over into the trough, down which it then gradually descends, by reason of its great weight, till it reaches the bottom, where its presence is manifested to you by its catching fire from the spirit lamp flame with which it there comes into contact. Carbonic acid gas being one and a half times heavier than air, sulphide of carbon vapour is more than two and a half times heavier.

I may avail myself also of the ready volatility of disulphide of carbon to illustrate to you the extremely low temperature at which its vapour is capable of being inflamed. I pour a few drops of the disulphide into this small cylinder, and then introduce the end of a glass rod, which has been gently heated by being held at some distance above an Argand flame; and directly on its coming into contact with the heated rod, the vapour in the cylinder at once takes fire. Indeed, a temperature below 400° Fahr. is sufficient to effect the inflammation of disulphide of carbon vapour. And a distinguished friend of mine has contended that the presence of the small proportion of disulphide of carbon vapour usually found in coal gas, is objectionable on account of its rendering the gas too easily inflammable. But it appears to me, that this objection is quite untenable, and altogether opposed to the experience of any of us who may have tried to light a jet of ordinary coal gas, however highly charged with sulphide of carbon, either with a gently heated glass rod or yet with a red hot poker.

The extreme volatility of disulphide of carbon, even at very low temperatures, accounts satisfactorily for the impossibility of our removing it from coal gas by any practicable process of condensation. Indeed, by cooling down any gas, you only cause a deposition of the excess of vapour in it beyond that which it can retain at the temperature to which it is cooled down. But coal gas, which could contain as much as one-fifth of its volume of disulphide of carbon vapour at 55° Fahr. and one-seventh of its volume of the vapour at 32° Fahr., is of course never charged to anything like saturation. Accordingly, little is to be hoped for in the way of the removal of sulphide of carbon from coal gas, by its mere condensation. You do indeed remove some of it, by reason of the tarry products deposited carrying down some disulphide of carbon with them; but from an otherwise pure gas, no practically attainable degree of cooling would effect any removal of disulphide of carbon whatever.

I may give you one or two further illustrations of the ready volatility of disulphide of carbon. Here is the solution of phosphorus in disulphide of carbon that we prepared a few moments ago. On pouring a little of this solution on a sheet of paper, the disulphide of carbon quickly evaporates altogether, leaving upon the paper nothing but a film of phosphorus, which, offering a large surface to the air, quickly undergoes oxidation, and bursts into flame. And, lastly, I may give you an illustration both of the low temperature at which the disulphide evaporates, and of the low temperature produced by its evaporation. On the top of this small stool I pour a little water, and stand upon the wetted stool a beaker containing some disulphide of carbon. On blowing into the beaker with an ordinary pair of bellows, evaporation of a portion of the disulphide is effected, whereby the temperature of the remainder is reduced considerably; but, so long as any is left, it continues to volatilize. And

new that the whole of it is volatilized, we observe the beaker to be sufficiently cold to have become frozen firmly to the stool, the intervening layer of water having been changed into a layer of ice.

Now, just as there is a difficulty in removing sulphide of carbon vapour from coal gas by condensation, so also is there a difficulty in removing it by washing. Indeed, it is so insoluble in water that we have no chance whatever of effecting its removal by scrubbing the gas with water. I take for convenience sake, a bottle, not of coal gas, but of air, and add thereto a few drops of disulphide of carbon; and you see that, by reason of the amount of disulphide of carbon vapour thus diffused through it, the air is rendered inflammable. I now half fill the bottle with water, and shake up its contents violently so as to effect a thorough washing of the air it contains; but that I have not thereby removed any appreciable quantity of the disulphide vapour is shown to you by the air still continuing inflammable.

With regard to the purely chemical properties of disulphide of carbon, the most interesting and important are those which it manifests with the caustic alkalis, but the consideration of these we will put off for a little while. A reaction of disulphide of carbon of some interest, by which indeed its presence in coal gas was first unmistakeably demonstrated, is its reaction with the remarkable compound discovered by Hofmann, and known by the elaborate name of tri-ethyl-phosphine. You remember there was a time when it was doubted whether the sulphur (other than sulphuretted hydrogen) existing in coal gas, was sulphide of carbon at all—whether it might not be some different unrecognized compound of sulphur instead. Now, the tri-ethyl-phosphine resorted to for the decision of this question, is a very difficult substance to prepare; like disulphide of carbon, it is a volatile substance, giving off vapour at ordinary temperature, and, when its vapour is mixed with air, a very slight increase of temperature is sufficient to cause the inflammation or explosion of the mixture. Thus I take here a piece of blotting-paper, which I wet with a few drops of the tri-ethyl-phosphine, and then place in a wide test-tube. The test-tube thus contains a mixture of air and tri-ethyl-phosphine vapour, and on now standing the tube for a minute in some warm water, you perceive we have at once an explosion. Now this tri-ethyl-phosphine, which the experiment I have just shown you indicates to be a somewhat dangerous substance to deal with, has the property of uniting with disulphide of carbon to form a well characterized orange crystallized solid. You see, on my adding a few drops of the disulphide to a little of the tri-ethyl-phosphine, a violent reaction takes place, and we get the orange compound produced. Now this same compound is produced when a current of coal gas is led slowly through tri-ethyl-phosphine, and its production of course establishes the existence of disulphide of carbon in the gas. But it does not at all follow that because some of the sulphur (other than sulphuretted hydrogen) occurring in coal gas exists in the form of sulphide of carbon, that therefore the whole of it exists in that form. From certain considerations, indeed, it would appear probable that the vapour of more than one sulphur compound exists in coal gas; although doubtless disulphide of carbon is the principal form in which the sulphur occurs.

I will next call your attention to the reaction, at a moderate heat, of disulphide of carbon vapour and hydrogen gas. This reaction is of interest as having been made by Mr. Vernon Harcourt the basis of a suggested means for effecting the removal of sulphur from gas. If you take either hydrogen or coal gas, which latter contains, you will remember, a large proportion of free hydrogen, and charge the one or the other with sulphide of carbon vapour, and then subject the mixture to a moderate heat, this result will be attained, that the sulphur which existed at first in combination with carbon, that is, in a form in which it cannot be removed by ordinary means, is caused to enter into combination with hydrogen, and so to exist as sulphuretted hydrogen—in a form I need scarcely say in which it can be readily enough removed. I can show you two experiments that illustrate this reaction. In the first, some pure dry hydrogen gas is passed over a little disulphide of carbon so as to acquire some of the vapour, then over lead paper to show its freedom from sulphuretted hydrogen, then through a gently heated glass tube, and then over some other lead paper, which you observe quickly becomes blackened, evidencing to you the formation of some sulphuretted hydrogen as a product of the decomposition of the disulphide of carbon taken up. In the other experiment we are passing ordinary coal gas, first over some lead-paper to show its freedom from sulphuretted hydrogen, then through a gently heated iron-tube to effect the decomposition of its disulphide of carbon, and lastly over some other lead-paper to show the production of sulphuretted hydrogen by the reaction. The nature of the reaction by which the sulphur, from being in the unmanageable form of sulphide of carbon, is obtained in the manageable form of sulphuretted hydrogen, is probably as follows:—

$$CS_2 + H_8 = CH_4 + 2H_2S.$$

That the process is thoroughly successful on a small scale has been demonstrated; and Mr. Harcourt is convinced that it would also prove successful on a manufacturing scale, and that it could moreover be practised without effecting any deterioration in the illuminating power of the gas. The uniform heating or reheating of any considerable body of air or gas has usually, however, proved a matter of some little difficulty in practice.

There is yet another reaction, taking place, I think, at a rather lower temperature, whereby the sulphur of coal gas, other than sulphuretted hydrogen, is converted into the form of sulphuretted hydrogen. This is a somewhat old story, which attracted a good deal of attention at the time when Mr. Bowditch brought forward his process of gas purification some years ago. When sulphide of carbon vapour in presence of water (either in the form of steam, or as the water of combination existing in slaked lime) is subjected to a gentle heat, a reaction takes place whereby, instead of having sulphide of carbon and oxide of hydrogen, we obtained oxide of carbon or carbonic acid gas, and sulphide of hydrogen or sulphuretted hydrogen gas, both products readily removeable by the ordinary processes of purification:

$$CS_2 + 2H_2O = CO_2 + 2H_2S.$$

This process of passing coal gas over heated slaked lime was practiced, I believe, for some time at the Wakefield Gas-Works, but not with such satisfactory results as to lead to any general adoption of the process. The difficulty was that for the reaction to place take at all completely, the gas had to be passed very slowly over the slaked lime, so as to remain in contact with it for a considerable time—for a greater time, indeed, than could be afforded in the course of the manufacture. Still it is a point worthy of being known by gas managers, that if you have steam and sulphide of carbon present together at a moderate heat, in the course of a little time they do react, with conversion of the sulphur of the sulphide of carbon into the form of sulphuretted hydrogen; and it being admitted that by far the larger proportion of the sulphur found in coal gas is produced at the latter stage of the distillation, and chiefly from the strongly heated and thoroughly coked charge in contact with the floor of the retort, it is certain, I think, that if at this stage of the distillation, a small quantity of steam could be in any way introduced or produced within the retort, all sulphide of carbon would be destroyed as soon as formed. As an illustration, I have here a small iron tube which contains a mixture of pyrites and coke—that is, such a residue as would be left by the distillation of a coal, rich in sulphur. The tube being heated to redness, I now pass a very small current of steam through it, and you see by the instantaneous and complete blackening of the lead solution, what an abundance of sulphuretted hydrogen we are in this way producing, with, of course, correlative destruction or non-production of sulphide of carbon

I am now about to call your attention to the relationship subsisting between disulphide of carbon CS_2, and carbonic acid gas CO_2. You know that when ordinary limestone is strongly heated, it breaks up into carbonic acid gas or oxide of carbon, and caustic lime or oxide of calcium:

$$CaCO_3 = CaO + CO_2.$$

But practically, at any rate, you cannot reproduce limestone or chalk by bringing together its constituents in the anhydrous, dry state. Instead of quicklime you have to use slaked lime or hydrate of calcium, and even then the action takes place but slowly, unless you facilitate it by employing your slaked lime in a slightly moistened condition. And this is only one instance out of many of the advantage, or even in some cases the necessity, of the intervention of moisture, where a soluble gas and a solid are required to act upon each other. Thus, with dry air and dry iron, there is entire freedom from rusting, but with the surface of the iron moistened, an absorption of the oxygen of the air takes place, and rust is very quickly produced. But in respect of the removal of disulphide of carbon from coal gas by means of any chemical absorbent, owing to the insolubility in water of the disulphide, we gain nothing, probably we lose something, by employing our absorbent moist; or we have to forego in the case of the difficultly removeable sulphide of carbon, the advantage we are so glad to avail ourselves of in the case of the readily removeable carbonic acid and ammonia. And, of course, this insolubility of the disulphide in water interferes very seriously with the removal of its vapour by means of absorbents dissolved in water, and used in scrubbers or wet purifiers, as I have, indeed, already remarked. But despite the difficulty consequent on its insolubility in water, there are agents capable of removing sulphide of carbon from coal gas, provided the gas is allowed to remain in contact with them for a sufficient length of time.

I would remind you, again, of the analogy subsisting between sulphur and oxygen. You know, for instance, that chalk is called by chemists carbonate or oxicarbonate of calcium, $CaCO_3$. Now, there exists another compound called by chemists sulphocarbonate of calcium, $CaCS_3$; and just as chalk or oxicarbonate of calcium is capable of being produced by the action of carbonic acid gas CO_2, on hydrate or oxihydrate of calcium $CaO.H_2O$—fresh slaked lime,—so is sulphocarbonate of calcium capable of being produced by the action of sulphide of carbon, CS_2, on sulphydrate of calcium, $CaS.H_2S$, the chief constituent of half-foul gas lime:

$$CaO.H_2O + CO_2 = CaO.CO_2 \text{ or } CaCO_3 + H_2O$$

$$CaS.H_2S + CS_2 = CaS.CS_2 \text{ or } CaCS_3 + H_2S.$$

Gas lime, then, in a particular state of foulness to which I shall refer more particularly in a minute or two, has the property of absorbing sulphide of carbon, much as slaked lime has the property of absorbing carbonic acid; though even under the most favourable circumstances the action is far more sluggish, and though, in practice, the circumstances never are so favourable, owing to our not deriving in the case of the disulphide that advantage from the employment of a moist absorbent, that we are accustomed to avail ourselves of in the case of carbonic acid. Further, just as carbonic acid may be absorbed equally well by some other hydrated alkali instead of by hydrated lime, so may disulphide of carbon be equally well absorbed by some other sulphydrated alkali instead of by sulphydrated lime. But it is obvious that the only sulphydrated alkali that can at all compete in point of cheapness with sulphydrated lime, is the sulphydrated ammonia always existing to some extent, and capable of being accumulated to a large extent in gas liquor. Sulphide of carbon, then, combines with sulphydrate of ammonia, $NH_3.H_2S$—more conveniently regarded as sulphydrate of ammonium, $(NH_4)HS$—to form the body sulphocarbonate of ammonium, $(NH_4)_2CS_3$, analogous to sulphocarbonate of calcium, $CaCS_3$, or, more strictly, to sulphocarbonate of potassium, K_2CS_3—two proportions of ammonium or potassium being equivalent to one proportion of calcium, thus:

$$\begin{array}{rrrr} & CaS.\ H_2S + CS_2 = & CaS.\ CS_2 \text{ or} & CaCS_3 + H_2S \\ 2\ KHS \text{ or} & K_2S.\ H_2S + CS_2 = & K_2S.\ CS_2 \text{ or} & K_2CS_3 + H_2S \end{array}$$

$$2\,(NH_4)HS \text{ or } (NH_4)_2S.\ H_2S + CS_2 = (NH_4)_2S.\ CS_2 \text{ or } (NH_4)_2CS_3 + H_2S.$$

Now, this sulphocarbonate of ammonium or of ammonia, which may also be written as $N_2H_6CS_3$, is a very unstable body. In presence of an excess of ammonia, it loses sulphuretted hydrogen to become converted into a new salt, sulphocarbamate of ammonia $N_2H_4CS_2$; which again, in presence of a further excess of ammonia, loses more sulphuretted hydrogen to become converted into sulphocyanate of ammonia N_2H_4CS; and you know how commonly deposits of this sulphocyanate of ammonia occur, in cases where the gas is left ammoniacal:

$$N_2H_4CS = (NH_4)CNS = (NH_3)HCNS.$$

But, although sulphide of carbon is absorbed most readily by sulphydrated alkali, caustic alkali is not altogether without action on it; and, provided the caustic alkali be dissolved in spirit of wine, the action is very prompt indeed. But the introduction of the spirit of wine leads to the formation not of a simple sulphocarbonate, but of a complex ethereal salt known as a xanthate. Sulphocarbonate of potassium being represented by the formula K_2CS_3, there is a corresponding ethereal salt known as ethyl-sulphocarbonate of potassium $(C_2H_5)KCS_3$, which differs only from the salt produced by the absorption of disulphide of carbon in alcholic solution of potash, or xanthate of potassium $(C_2H_5)KCOS_2$, by containing three proportions of sulphur instead of two proportions of sulphur and one proportion of oxygen. This xanthate of potassium is a crystalline salt, and may be produced in any quantity with the greatest ease, by the simple mixture together of alcohol, caustic potash, and disulphide of carbon, thus:

$$(C_2H_5)HO + HKO + CS_2 = H_2O + (C_2H_5)\,KO.CS_2 \text{ or } (C_2H_5)KCOS_2.$$

I can illustrate to you the formation of this salt very readily. I take some spirit of wine or alcohol, dissolve in it a little caustic potash, then add to it some disulphide of carbon, and agitate the whole for a minute or so. The xanthate is now formed; and on pouring out a little of the liquid into water, and then adding some sulphate of copper solution, I get thrown down the characteristic orange-yellow precipitate of xanthate of copper, from the production of which the acid acquires its name of xanthic, meaning yellow. Now if you take ordinary coal gas and pass it slowly through an alcoholic solution of caustic potash, you will find the gas to be deprived in great measure of its sulphur, and xanthate of potassium to be formed in the liquid. And the formation of xanthate of potassium under these circumstances, will be another evidence to you of the existence of the sulphur contained in the original gas, in the form of disulphide of carbon.

But in practice, we cannot, of course, resort to alcoholic potash as a purifying agent, but must content ourselves with sulphydrated ammonia or sulphydrated lime, that is to say, with gas liquor or foul lime in a particular condition; and, having been consulted by certain gas companies, to help them out of the difficulty they were in with regard to the large proportion of disulphide of carbon which continued to exist in their gas, despite every attempt to effect its reduction, my attention has of late been especially directed to the subject of sulphur purification; and I believe I am now in a position to point out to you the proper mode of using the agents of which I have just spoken, so as to produce a uniformly beneficial result. You are

aware that trials and experiments out of number, and in ways the most various, have been made in the use of both lime and gas liquor, to effect the desulphuration of gas; and that, although at times and places, some of these trials have led temporarily to most satisfactory results, they have not resulted in the introduction of any definite method of procedure which could be constantly and everywhere relied upon. Now the essence of the method which I was led to suggest, and which has furnished excellent results in practice, consists in treating the gas for its disulphide of carbon in a distinct set of purifiers charged with sulphydrated lime, carefully maintained in the sulphydrated state by the previous removal of all carbonic acid from the gas in an initial set of clean lime purifiers, and supplemented by a subsequent removal of sulphuretted hydrogen from the gas in a final set of oxide purifiers. This recommendation agrees in substance with that of the gas referees, than which, however, it goes a little further. It was made, however, without knowledge of the results and conclusions of the referees, and indeed a few days before the publication of their very able and complete report.

In unpurified coal gas, there are three substances of an acidulous character present, namely, carbonic acid, sulphuretted hydrogen, and sulphide of carbon. Of these three, carbonic acid, though indeed but a weak acid, is alike the most strongly acidulous and the most abundant. If then, you pass your gas over slaked lime or through caustic ammonia, so long as the alkali is in considerable excess it will absorb not only the carbonic acid, but also sulphuretted hydrogen, and jointly therewith some disulphide of carbon. But this last action, partial at the best, soon becomes insignificant. To effect by means of alkali, the continuous removal of the least chemically active and least abundant of the acid impurities, you must take away the most active and abundant of them first. You must make the complete removal of the carbonic acid from your gas an object of primary importance, and effect its removal as a separate operation; not so much because of any objection to its retention in the gas delivered, as because of its non-removal interfering with the efficient removal of the sulphide of carbon. The process of purification then, which I was led to recommend to those who consulted me, and which I now recommend to you, consists of three operations:—

1. The gas from the scrubbers, should first be purified completely from carbonic acid, by being passed continuously through three out of four lime purifiers in the usual manner; putting the fourth purifier into the series, and throwing out the first purifier, whenever the gas from the outlet of the second purifier produces a decided effect on lime water.

2. The completely decarbonated gas should next be treated with a view to remove from it its sulphur, not in the form of sulphuretted hydrogen. With this view, it should be passed through another set of purifiers, charged with lime that is left unchanged for weeks and even months together. The hydrated lime in these purifiers, by its union with the remaining sulphuretted hydrogen of the decarbonated gas, will quickly become converted into sulphydrated lime, and will remain in the form of this compound for an indefinite period, provided only that the gas passed over it is first completely and continuously decarbonated. Notwithstanding the small actual quantity of impurity to be removed by these purifiers, they should be of full size, so as to allow time for the somewhat sluggish action between the sulphide of carbon and sulphydrated lime to take place in them.

3. The gas, after having been completely freed from carbonic acid, and treated for the removal of sulphide of carbon by being transmitted through sulphydrated lime as above described, should finally be freed from sulphuretted hydrogen, by being passed through three out of four oxide of iron purifiers in the usual manner.

Instead of being treated firstly with caustic lime frequently renewed, to remove the carbonic acid, and secondly with caustic lime renewed as seldom as possible, to remove the sulphide of carbon, I have no doubt that equally good results might be obtained by treating the gas, firstly with caustic ammonia frequently renewed, to remove the carbonic acid, and secondly with caustic ammonia renewed as seldom as possible, to remove the sulphide of carbon; though with regard to the success of this modification of the process, I cannot speak from experience. The caustic ammonia for the purpose might be obtained from gas liquor, by Mr. Hills' very ingenious process, which has been put in practice by Mr. Livesey at the South Metropolitan works, I believe with complete success. I do not know whether cleansing gas with caustic lime or caustic ammonia would prove in practice the most economical and otherwise advantageous. This I leave to you; as also any variation in the details of the mode of proceeding I have just described. I profess only to explain to you the chemical conditions necessary for the removal by means of caustic alkali, of sulphide of carbon, jointly with some sulphuretted hydrogen from coal gas.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

ANNUAL GENERAL MEETING.

The Eleventh Annual General Meeting of the North British Association of Gas Managers was held in the Rector's Class Room, Academy, Perth, on Friday, July 19, 1872—Mr. J. K. WATSON, Edinburgh, occupying the chair.

There were about seventy members present.

Mr. W. MACKENZIE, Dunfermline, the secretary of the association, read the minutes of the last annual general meeting, held in Edinburgh on the 19th of July, 1871, and the minutes of committee meetings held since that date, and all of them were approved of.

The committee, in a minute also read by the secretary, recommended to the meeting that the next annual general meeting of the association be held in Edinburgh, in 1873, simultaneously with the meeting there of the British Association of Gas Managers. An amalgamation of the two associations, the committee said, was desirable.

Mr. J. REID (Edinburgh and Leith Gas Company) moved that the committee's recommendation and proposal of amalgamation be adopted. The amalgamation with the association of their English brethren was, he considered, decidedly worthy of encouragement, and he hoped that the meeting would be unanimous in agreeing to his motion.

The motion was carried without dissent.

The following gentlemen were then nominated, and unanimously elected members of the association:—Messrs. William Fowlis, Glasgow; John M'Crae, Dundee; James Page, Strathmiglo; Henry Landale, Leven; Hugh M'Gillivray, Blairgowrie; James Watson, Grahamstone; Thomas D. Hall, jun., St. Andrews; J. Alexander, Corstorphine; and John Swan, Kingskettle.

Messrs. Henry Mungall, Cowdenbeath Collieries; R. B. Symington, Lochore and Capledrae Collieries; David Blackie, of D. Grant and Co., Edinburgh; and D. Bruce Peebles, Edinburgh, were admitted extraordinary members.

Mr. B. M. M'Crae, Dundee, was elected president of the association for the ensuing year; and Mr. William Fowlis, Glasgow, was elected vice-president.

Mr. W. Mackenzie, Dunfermline, was reappointed secretary; and Messrs. Watson, Edinburgh; Reid, Edinburgh and Leith; Whimster, Perth; and Cuniter, Dalkeith, were elected members of committee.

The PRESIDENT ELECT, in thanking the members of the association for appointing him president, said he was happy to accept office, and trusted he would be enabled to maintain the dignity of the position so worthily held by his predecessors.

Mr. FRASER (Inverkeithing), the auditor of the financial affairs of the association, read his report, from which it appeared that the funds are in a very satisfactory condition.

The PRESIDENT (Mr. Watson) then delivered his opening address, as follows:—

PRESIDENT'S ADDRESS.

Gentlemen, Grateful for the honour you have done me in electing me to occupy this chair, I wish I were better qualified to open the day's proceedings by an address worthy of your attention. Somewhat fortunately for me, and very much so for you, the limited time at our disposal prevents my coming before you with any lengthy statements, and I shall only glance at what is going on in our quarter of the gas world, and hint at the resources to which we must have recourse in the extraordinary circumstances in which, if not already, we may ere long be placed. These are times when our prospects as public servants are not cheering. Cheap light seems about to vanish, and at the present time light of the high quality we have been accustomed to furnish seems hardly attainable. Not only have all the commodities we require risen to prices never reached before, but our raw material—the Scotch parrot coal—on which the excellence of our gas now entirely depends, is leaving us for the use of others at distances, and in quantities and at prices we have not hitherto imagined. The supply for home use has never been shorter, and there is reason to fear the scarcity during the coming winter may be such as in some places to throw serious obstacles in the way of the supply of light. But, gentlemen, these difficulties must both be faced and overcome, and I believe the energy and capacity of the North British gas managers will be found equal to the demand made upon them. Extraordinary times must call forth extraordinary efforts; and the very difficulties with which we are now surrounded may lead to discoveries and appliances permanently beneficial to the public interest. The position of the labour market demands that every means should be taken to substitute machinery for manual labour wherein it can be applied, and costly machines can be more easily afforded now that wages have so greatly advanced. In this direction I am glad to notice we are to have a communication laid before us to-day by Mr. Reid, whose talents as an engineer ensure the value of the information he will convey to us. I could have wished some one had sent us a communication on machine stokers; but, though we have nothing on this subject now, I trust next year may bring us more than one description of their adaptation and of their efficiency. Machinery may also be expected to be brought successfully into use for preparing the material for the retorts. The breaking of the coal is in large works a heavy item of expense, and the only drawback to the machine breakers used for other purposes seems to be that when applied to coal they do their work too effectually—a dawback which it is to be hoped a little perseverance will remove.

In view of the scarcity of parrot coal, Mr. Alexander is to give us an account of his experience of the use of shale at his works at Corstorphine. I can testify to the very high illuminating power of his gas, having been recently afforded an opportunity of examining it. Some gentlemen present will, I have no doubt, be able to supplement Mr. Alexander's communication by stating their own experience of the use of shale. The high illuminating power of the gas from shale is beyond question, and though, as in parrot coals, there are varieties, the shales yield generally gas of much higher power than ordinary parrot coals, while many of them produce gas nearly equal to that procured from the Boghead mineral itself. There are great drawbacks to their use, from the small quantity of gas per ton they yield, from the worthlessness of the residuum left in the retorts, and from the different nature of the liquid products; but the difference of price between them and first-class cannels, where there is no very heavy carriage, will compensate for all, while the quality of the gas will admit of the use along with them of a very large proportion of coal yielding inferior gas and good coke. It is some comfort, too, to reflect how widely diffused the shales are, how cheaply they can be brought to the surface, and what an abundant supply of light-giving material our country possesses, whether for the manufacture of gas, oil, or paraffin. For the first of these purposes, I believe the distillation from the shale, in the same manner as we now treat the parrot coals, will be found to be the most economical process. With these shales at our doors, even if all the cannel coals were exported elsewhere, there seems no need to fear that the people in our northern district will be put to the necessity of contenting themselves with gas of low illuminating power. Great changes may be necessary to adapt gas establishments to the use of shale, but if the changes are really necessary, the enterprise to effect them need not be withheld. All of us who have been long at work have had in the past to abandon apparatus put up in the hope that it would at least serve our day and generation, and why should we wonder if in this age of progress it should fall to our lot to do so again.

Gentlemen, I have ventured to advance these views on the use of shale in the face of Dr. Macadam's kindly promised lecture on the employment of paraffin oil in the manufacture of coal gas—the product of the shale in place of the shale itself. I trust the doctor will show us another, and still a better way to serve those who depend on us for that great social benefit, the supply of a pure and powerful light.

Allow me now to allude to the courteous invitation received from the British Association of Gas Managers to send a deputation of our association to represent us at their recent meeting. It was with much regret that your committee found that from want of time it was impossible to make the necessary arrangements, and that this kind attention on the part of our friends in the south could not be made available. We hope that their meeting in Edinburgh next season may lead to a closer union between the two bodies, and to kindly and profitable intercourse.

And now, gentlemen, I am privileged to conclude this short and imperfect address by a more pleasing task than has fallen to the lot of any of my predecessors in this chair. I am sure there is not one of them who would not, with all the cordiality in his power, have expressed his high appreciation of the manner in which our excellent friend, Mr. Mackenzie, has performed the duties of secretary to this association during the past ten years. These duties have not been small. They have been performed with much pains and punctuality, and every member must be sensible of the pleasure which has been derived from the excellence of his arrangements and the kindliness of his manner. Need it be a matter of surprise that we should desire to express our sense of these things in some permanent way? It has taken the form of the claret jug and salver now before you, and of which, in your name, I have to ask him to accept. We hope Mr. Mackenzie may be long spared to enjoy the use of them, and that he may leave behind him those who will regard them as proofs of his having set them a good example, and who will preserve them as heirlooms for generations to come.

Mr. MACKENZIE, having received the gift, said: It becomes me, Mr. President and gentlemen, in accepting this very beautiful testimonial from you, to return my heartfelt thanks for your great and, I must say, altogether unmerited kindness. I have risen full of feelings of gratitude towards you, but I am totally unable to give expression to them. At no time has it been in my way to give expression publicly to my opinions, and at the present time I feel quite incapable of doing more than tell my brethren in the profession how much I value this very beautiful token of their esteem. Our excellent president has referred to my labours in connexion with the association. I assure you that when I look back upon the last ten years, beginning with the origin, and proceeding with the continuance of the association, I experience feelings of very great pleasure indeed. My labours have not been heavy by any means; they have, in fact, been in every sense of the word labours of love. And my chief regret has always been caused by the want of the time to give these duties which I feel they require. I am unable to say more, but crave your indulgence, and hope that you will accept of my most grateful

thanks for this beautiful gift, the preservation of which shall be the pride of myself and family.

Mr. J. ALEXANDER (Corstorphine) read the following paper :—

SHALE AS AN AUXILIARY IN THE MANUFACTURE OF GAS.

The recent changes in the coal trade of our country, and the unprecedented price to which coals have risen, must lead every one engaged in the manufacture and supply of gas to consider how these changes are to be met, and the difficulties they have caused to be surmounted.

Some of our leading parrot coals being now quoted at 40s., 35s., and 28s. per ton, which a year ago could be obtained for 28s., 24s., and 18s. per ton respectively, the question comes, whether the requirements of gas-consuming communities, and their growing desire for gas of high illuminating power, at a cheap rate, can be met, and those who have invested capital in the erection of gas-works receive an adequate remuneration for the outlay in the shape of good dividends in the present state of the coal market. If these two points can be accomplished, it is pretty certain that gas managers will not participate largely in the almost universally accorded boon of short hours and increased pay.

The great advance in the price of coals may be attributed partly to the last-named movement and partly to the great increase in the export trade. Nothing in the meantime can be done with the former, and only legislative interference could remedy the latter; which there can be but little hope of securing in the days when Free Trade principles are so popular.

A rise in the price of gas would be of service, and doubtless this will have to be resorted to; but a rise in the manufactured article at all commensurate to the advance in the price of the raw material would ensure very general and wide-spread dissatisfaction.

The next best thing to be done is to endeavour to obtain gas of equal, and, if possible, greater illuminating power from some other material. It will be my object in what remains of this paper to show that shale may be used with advantage, not certainly as a substitute, but as a subsidiary in the manufacture of gas.

If this material were pretty generally employed, we should be less dependent on the supply of parrot coals, and from this cause the present high price might recede somewhat.

At the risk of being charged with egotism, I shall give the result of my experience for a few months past in the use of shale, and point out as clearly as I can the advantages and disadvantages accruing from its adoption; a laboured or scientific disquisition on the subject I leave to those more favoured than myself with leisure and the necessary appliances for such investigations.

My attention was first called to the use of shale in December last, when a gentleman largely connected with an extensive oil-work, near Bathgate, waited on me, requesting that I would make trial of two samples of shale and report the result. The samples were soon after forwarded, and selecting a dull day which gave no indication of a rise in temperature, I charged two retorts, marking the gasholder at three points of its circumference (there being no station-meter in the works). In five hours I found the yield to be equivalent to 6500 cubic feet per ton. This trial was made from curly shale; a similar experiment from plain shale was not so satisfactory, the yield being only about 5000 cubic feet. A trial of the first was made by another party, who has at command all the necessary apparatus for thoroughly testing both the quantity and quality of the gas obtained, which he gave as 7200 feet per ton. To the experiment made by me must be allowed a small quantity for leakage, as also the chance of some being used by consumers while the trial was being made.

In the spring months, as the demand for gas diminished and coals still continued to rise in price, I procured a stock of curly shale, resolved to give it an every-day practical trial. Since the beginning of March, with the exception of a small quantity of parrot coals on Saturday evenings, and about one-fourth of splint coals used with the shale, but not in the same retort, I have used nothing else. Sometimes I used as much as one-half of splint, and found the gas of high illuminating power.

The gas produced from shale in a gas-work is very far superior to that supplied from oil-works, where the richer portion is sent off in the form of oil, and cannot be what is known as a fixed gas, being generated at a low heat.

I shall now endeavour to point out some of the advantages to be gained by the use of shale, and then advert to some of the drawbacks which, under certain circumstances, will be found to exist, and interfere with its adoption.

The great illuminating power of shale gas is its first recommendation. This, from experiments made not only by myself but others, I have found to be as high as 43 candles, while a practical chemist, who tested it by photometer, gave it as high as 50, and this with a mixture of 3 to 1 of splint. Taking the average of six experiments made by a party daily engaged in such work, and extending over nearly twelve months, in which the photometrical test and durability test do not agree, it gives 32 candles to 77 minutes of durability, and with this, as a rule, I have found the durability frequently 92 or 94 minutes, and on one occasion 102 minutes, or equal to an illuminating power varying from 38 to 43 candles. I hope to be able to gave fuller particulars on this point before the general meeting, as I have the promise of a thorough testing of this gas by a gentleman who stands high in the gas world.*

Its cheapness is the next qualification to which I shall direct notice. The shale I have been using costs, including freight and cartage, 10s. 8d. per ton, which, used in the proportion of 3 to 1 of splint coals, costing 16s. per ton, makes the price 12s. per ton. The parrot coals I have of late been using cost 36s. per ton, and mixed at the same rate as above with splint at 16s. the price per ton is 31s. Assuming that shale gives only one-half the yield of parrot, the cost will be as 24s. to 31s., or 7s. infavour of the former. The illuminating power from the shale thus mixed being 38 candles, and superior to the gas from the parrot, would admit of a cheaper and inferior coal being used, and thus increase the quality of coke for fuel, and lessen the cost. During the summer, the consumption being so small, there is not—even using parrot coal—sufficient coke to serve as fuel, and with shale more fuel has to be purchased, but this does not exceed one-third per ton of shale carbonized.

The facility of purification is deserving of notice, as shale requires less lime; or, more properly, the lime continues longer in a useable state in the purifiers than with parrot coal. It is also very free from carbonic acid, as it takes nearly 30 minutes before any discoloration of the lime water can be perceived, thus proving that the gas is perfectly safe in use.

I am of opinion that the accumulation of carbon in clay retorts will be less with shale than with coal, but my experience in this is as yet too limited to permit stating this definitely.

It is worth notice that in using shale, oil more than tar is disengaged, the liquor being of an oily or greasy appearance, and on the surface, while coal tar is found at the bottom of the tar pit, and the ammoniacal liquor at the top. Some time ago it was suggested that small gas-works might with advantage use dross saturated with coal tar for making gas. Might not this oily substance from shale be more advantageously employed?

I shall now proceed with the drawbacks to the use of shale, and these will, I think, vary according to circumstances and local position. The small yield contrasted with what is obtained from good parrot is against its use, and will lead to the increase of retort power, either in increasing their number or size. The original cost of such increase is, however, all that meets us here, as it will be found that three retorts in one oven can be heated as easily as two similarly set, and two in one oven are as unusual in fact as a single retort set by itself. This at least has been my experience in the matter. Its great weight compared with coal might prove unfavourable for works situated far from shale. On account of its weight, the same number of charges for a retort cannot be obtained per ton as from an equal weight of coal; hence I would venture to suggest that retorts to be used for shale should be wide, to permit the shale lying as thinly as possible on the heated surface, as it is apt to get packed or dense in retorts where the depth and width are equal, or nearly so.

A more rapid evolution of the gas would thus be obtained if the shale is spread in a thin layer. Next is the entire want of coke, and this in some cases may almost prevent its use, or permit only its very limited introduction. In smaller works, where, even with coal, the greater part at one season, and the entire yield of coke at another, is required as fuel, shale could not be used so economically where fuel would have to be purchased to maintain the heat, and this would have to be charged against the original cost of the shale. This, however, is somewhat mitigated by the fact already alluded to, that, owing to the great illuminating power of shale gas, a larger quantity of inferior coals can be used, and thus the bulk of coke increased. I need scarcely say that shale and coals should never be used except in separate retorts.

In our larger works, where space is valuable and the consumption of gas large, some inconvenience will be experienced from the great accumulation of useless rubbish consequent on the use of shale, but something might be devised for getting quit of it at a trifling cost. I find that by never quenching it, but emptying it in a hot state, it is soon reduced to ashes, and its bulk very much diminished. I am informed on good authority that these ashes might be turned to some account in sanitary matters, as they form a very efficient deodorizing substance, superior to dried earth, or anything hitherto employed for such purpose. The ashes appear to consist chiefly of earth or clay; might they not, when put through a coarse sieve, and properly moistened, be of some service, on one or more trays of a purifier, in assisting to fix ammonia, for which purpose I have used with great benefit common earth for years? If of any service in this department, and once saturated or impregnated with ammonia, there would be no difficulty in disposing of this portion of the residuum of shale.

One fact more, and to me the most satisfactory and tangible, that on comparing the accounts for coal used for the quarter ending June 30, 1871, with that for the corresponding quarter of the current year, and this, too, with an increased consumption, the balance is in favour of shale against coals, at 10s. per ton of last year.

I have thus given a rough outline of my experience in the use of shale, and I do not mean to say that it will ever supersede coal in the manufacture of gas, but may become a useful auxiliary thereto. I will be glad if some with more leisure, and the requisite appliances at command, will enter on this subject in a scientific form, and do it more justice than I can, and assist in the production of gas at a cheaper rate, when coal is so extravagantly high in price.

If the above remarks lead to this, or be of any service to some who, like myself, have to contend with a limited consumption, great high illuminating power, and dear coal, and have in any way helped in obviating the difficulties they may experience, I feel I shall not have lost my labour.

The PRESIDENT: Mr. Alexander's paper is a very interesting one, and has evidently been prepared with great care. Have any of the members anything to say regarding this subject of shale as an auxiliary?

Mr. WHIMISTER (Perth): I have listened with great pleasure to Mr. Alexander's paper, and think it a thoroughly practical one. I have had experience of shale for some seven or eight years, or perhaps longer. At one time I used it in considerable quantities, I should say about 1-5th of my whole coal carbonized was shale. I found that I had about 8300 cubic feet per ton of a very rich gas of about 35-candle power from one kind of shale. From another kind I had about 7000 cubic feet of 25-candle gas. I observed, while the paper was being read, that Mr. Alexander put the saving, or advantage to be gained by using shale, at 7s. per ton, and at the close of the paper he mentioned it at 10s. per ton. That, of course, varies according to the quality of the shale, and the locality where it is being used. I find that shale is keeping company with parrot coal, which is going up in price very rapidly. I had 500 tons this year at a higher price than had been paid for it before. If it becomes a matter of competition it will go up in price with coal, with which I find no difficulty in using it. One thing might, to some extent, be modified in the paper. The weight of the shale does not signify; it is the bulk. I could get as much gas out of a retort, with shale as out of one with parrot coal. Put in perhaps 2½ cwt. of shale into a retort, and it does not take more room than 1¾ cwt. of any coal, and if there is a good sharp heat, you can carbonize it as easily as any coal. The rubbish has to be carried away at so much a ton. I have thought that grinding it and saturating it with ammonia for manurial purposes might make it of some value, but I do not know. It is a very hard gritty substance, not like the Boghead mineral. I do not know that there are any hindrances in the way of using shale. It is just a question. Can you want the coke? Have you a place in which to deposit the rubbish? and what will the carriage cost you? The latter is a serious matter if you are at places a considerable distance from the shale-fields, such as Aberdeen or Inverness. You would in that case have a heavy tonnage to pay for 7000 or 8000 tons of shale, as the case might be, when you can get 11,000 or 12,000 cubic feet of gas by using parrot coal of the same weight. I think, however, it is well worth the attention of gas managers, this matter of shale. Were they to use more or less, as circumstances would allow, they would soon find how much it is worth to them.

Mr. B. M. M'CRAE (Dundee): I have heard with pleasure Mr. Alexander's paper. The ideas in it have been practically brought out. I have been using shale for the past 10 years, and I quite agree in everything Mr. Alexander says, except as regards the price. Shale will rise in price until it becomes a question of the greatest value. It would be a pity that we should allow our professional brethren to be impressed with the idea that by using shale they will save 7s. a ton. I never could calculate on that. Mr. Alexander's place is favourably situated, being at the back door of the best shale-field in Scotland. Mr. Whimster's shale, on the other hand, is probably not the very best shale. The price of coal is going up. The hours of labour are being shortened, and men's wages are going up; but the increase of the remuneration of all artisans will enable them to pay more for the gas; and if they are anxious for more comforts, and willing to sacrifice a little, they will assuredly make such a sacrifice. We need not continue to give a high quality of gas at the present price. We should express our minds at once, that the people, if they want it, must pay for good gas. We will not find a high quality by the use of shale or paraffin oil. It must only be found by a rise in the price of gas or a reduction in the price of coal.

Dr. STEVENSON MACADAM (Edinburgh): I endorse the opinions of Mr. Watson, Mr. Whimster, and Mr. M'Crae as to the value of Mr. Alexander's paper. Regarding the question of auxiliaries, I may say that in experiments I have made from time to time as to shale being directly used as the raw material, I have obtained results entirely bearing out Mr. Alexander's statements. Shales, of course, differ from each other in quality. A work I examined recently, and which I fancy has some connexion with Mr. Alexander's place, gave a proportion of upwards of 7000 cubic feet per ton of gas of a candle power of 33 —7300 feet, in fact. That was good shale; but the great bulk of shale will

* The results of this testing have been received, and it shows the average quality of the gas to be 41·99 candles. The materials used were shale and splint coal, in the proportion of five parts by measure of the former to three parts of the latter, also by measure.

not give that proportion or quality of gas. Some shales, if you carbonize them at high heats, will give a considerable quantity of good gas—say 4500 cubic feet per ton—of 25-candle power. You will get a less proportion at a lower heat, and necessarily, of course, an increase in the illuminating power. We cannot, however, look forward to shale (taking the average quality of it) as likely to yield more than 5000 cubic feet per ton, and with an illuminating power of from 25 to 30 candles. You can, if you choose, taking good shale, get a gas of 40 candles, or even higher; but if you try to obtain a high quality like that, there is a tendency to condensation in the gasometers, and the quality of the gas then comes down from day to day. Previously to my recent experiments on this subject, I found that when it was attempted to get a rich gas from shale, mingling it with thin gas, there was also a tendency to condensation in the gasometers. In respect to the quality of the ash left in the retort, I am afraid that although we might call it coke it is almost practically ash. There is hardly a use to which it can be put; it will soon suck up ammonia, but the proportion must be extremely small. I think we must take Mr. Whimster's view of the ash, and consider it simply as dead material which we must pay the expense of carting away.

Mr. CUSITER (Dalkeith): If obtained at a cheap cost, shale will be found economical to use along with splint coal to produce the quality of gas desired. I have used splint with both plain and curly shale with results of from 6000 to 7500 cubic feet per ton of a gas of from 26 to 34 candles illuminating power. I have also tried a number of samples of a debateable nature. They were out of courtesy called cannel coal. I found in these samples a very large quantity—nearly 12,000 cubic feet—of splendid gas, from 30 to as high as 38 candles illuminating power. The only drawback, and a very important one it is, is that the coke from this class of mineral is worthless as fuel in gas-work furnaces. This necessitates a separate set of retorts for their use, and it also makes necessary the removal of the resulting coke from the works. This very loss of fuel and cause of removal resolves the question simply into this: At what rate per 1000 cubic feet can gas be obtained say of 25-candle power from shale and splint coal, as compared with the cost of gas of the same standard obtained from a mixture of cannel coal? The answer will, of course, greatly depend upon the relation of the gas-works to the shale fields, and the expense of transference from the place of production to the place of consumption.

Mr. G. R. HYSLOP (Paisley): I have some experience of the use of shale, and I may state that I have annual offers from parties who possess shales of supplies for the year, but I invariably find that the proprietors of the shale-fields are posted up as to the value of their shale as compared with cannel coal. I find also that the shale is now 2s. or 3s. beyond the price I could give for it, to say nothing of the additional cost of the removal of the refuse. With regard to the number of retorts referred to in the paper, I have to say, according to my view, that, as a general rule, the richer the shale the fewer should be the number of retorts, because a greater degree of heat is required to liberate economically the gas of the shale. On the other hand, as the value of the material diminishes, you increase the number of retorts, thus approaching to the English method. In England, under their system and with their materials, they cannot obtain the results we secure. Indeed, they fall very far short—15 or 20 per cent. below the results generally obtained in Scotland. Their larger retorts are not sufficient to yield them. In other words, a large proportion goes into the form of tar. Where gas from coal does not exceed 28 candles, it would not be so important to mix the coal, but where it goes from that power upwards, I should say the advantages would be in proportion to their value. Few companies supply gas of more than 29 candles; a mixture of that kind to them, therefore, is not of great imporiance. The mixing of shale in retorts, I think, would be a very unprofitable thing.

Mr. FRASER (Inverkeithing): We are under a deep debt of obligation to Mr. Alexander for his paper. This shale, I am afraid, is not going to help you very much. There are not the large fields of bituminous shale that some think exist. All the deep pits have been unsuccessful. When they came to be sunk to the depth of 100 fathoms the oil was pressed out, and the shale thus became worthless. I think it is a very important question that is to be taken up at this meeting by Dr. Macadam ("The Employment of Paraffin Oil in the Manufacture of Gas"), as to whether the crude oil could not be applied to the making of gas more so than shale. We could not carry the oil-producing shales cheaply enough, but if the gas were thoroughly condensed in the form of oil we might pay the carriage of the oil, and then by some process, which some of you could easily find out, it might be used to give some supply of gas. If the English gas-works who make a large quantity of gas would take some plan that a portion of oil could be used in the retorts, it might be the means of cheapening parrot coal to last for a generation. If the ash of shale be expensive to carry away, the managers might think of making fire-bricks of it.

Dr. MACADAM: The fact is that it consists more of sand than of silicate, or anything else.

Mr. FRASER: There is a most extraordinary brick made in London, of which 25 per cent. is silicate.

Mr. CUSITER: May we not be laying too much stress upon the material to be used, and too little on the retorts in which the material is to be distilled? I have seen a retort in operation, very different in shape and arrangement from those in common use at present, from which superior results, both as to quantity, quality, and reduction of tar, have been obtained. You will hear more about it afterwards, but in the meantime I can say nothing further about it.

The PRESIDENT: Can any gentleman give us information concerning the qualities of the liquid products of shale as used in gas-making? What quantity of ammonia and benzole do you get from shale as compared with coal?

Mr. G. R. HYSLOP: The quantity of tar, as a rule, is much larger, and the richer the shale the greater the quantity.

Mr. WHIMSTER: In the absence of minute analysis of the secondary products of shale, I may say that when using shale in Perth largely, and selling crude naphtha at 15 per cent. of benzole consigned to London, although I changed from parrot coal to shale, I found no appreciable difference in the quality of the naphtha, neither did I find from the result of the year any appreciable reduction in the quantity of ammonia produced.

Mr. B. M. M'CRAE: Were there more or less gallons of the crude?

Mr. WHIMSTER: I could not say. Although I used, say, 800 tons of shale instead of 800 tons of parrot coal on the year's work, I did not find any appreciable difference in the result of my secondary products utilized, naphtha and sulphate of ammonia.

Mr. B. M. M'CRAE: If you use shale, you are enabled to use a very much larger quantity of splint coal, and that coal gives a larger quantity of ammonia than cannel coal does. The one makes up for the other.

Mr. WHIMSTER: That suggests a recollection of mine that may be stated. When I was using the shale at the time I have spoken of, I was competing against an opposition company, and as the price of my gas was fixed, I increased the illuminating power, and therefore I did not use splint, but parrot, and thus kept a high quality of gas, sometimes of 40-candle power.

Mr. J. REID (Edinburgh and Leith): I think the paper by Mr. Alexander deserves our thanks, in so far as it has elicited a very interesting discussion, and I move that the thanks of the association be given to Mr. Alexander accordingly. I take leave to make a suggestion as to the difficulty about the disposal of the residue. In my younger days, in this, my native town, I remember a suggestion originating in the Town Council. Forty years ago the town was anxious to improve the navigation of the river Tay, and it was proposed that a tidal harbour should be formed. A difficulty regarding the disposal of the material taken from the site of the proposed harbour arose, when one gentleman, a magistrate, suggested that a hole should be dug in the South Inch (one of the public parks of the town), and the material buried therein. (Laughter.)

Mr. G. R. HYSLOP seconded Mr. Reid's proposal of thanks to Mr. Alexander, and the motion was unanimously carried.

The PRESIDENT: We must refer the paper to a committee.

Mr. J. Reid, Mr. B. M. M'Crae, and Mr. Whimster (Mr. M'Crae, convener), were then appointed a committee to consider the paper and report.

MALTON (YORKSHIRE) GAS AND COKE COMPANY.—The annual meeting was held on Monday, the 22nd ult., when a dividend of 8 per cent. per annum was declared, free of income-tax. It was stated that the immense increase in the cost of coal and iron quite precluded any attempt to reduce the price of gas.

NEWCASTLE-UNDER-LYNE GAS COMPANY.—On Saturday, July 27, the annual meeting of the directors and shareholders was held at the offices of the company. Mr. W. Hargreaves, chairman of the board of directors, presided. The annual report which was presented showed that the works were in a satisfactory state. In the out-districts a slight increase in the price of gas had been made, owing to the greatly advanced cost of coal, &c. The usual dividend was declared, and the routine business transacted.

STOCKTON CORPORATION GAS-WORKS.—At the quarterly meeting of the Town Council, the Gas Committee recommended the council to raise the price of gas 4d. per 1000 cubic feet within the borough, and 5d. per 1000 cubic feet outside the municipal boundaries; also ordered that from the 1st of August the price of coke be £1 per ton. The borrowing powers of the Corporation for gas purposes being exhausted, the council were recommended to apply to Parliament for an Act giving further borrowing powers to the amount of £100,000. The minutes were passed.

SUPPLY OF GAS TO DUMFRIES.—At the meeting of the police commission, on Friday, August 2, the following resolution was adopted:—"That whereas the Dumfries Gaslight Company having failed to accept the offer for their works, &c., of the sum specified in Mr. M'Crae's valuation, it be remitted to a committee of the whole commission to obtain the necessary guarantees for the expense to be incurred in obtaining parliamentary authority for the acquisition of the same, and report to a monthly or to a special meeting."

PRICE OF GAS AT OLDHAM.—A rumour has obtained rather extensive currency of late, to the effect that the Oldham Corporation are contemplating an increase in the price of gas. The greatly enhanced price of coal and other articles has been spoken of as sufficient ground for justifying such increase, but however that matter may affect the operations and financial position of the Gas and Water-Works Committee, we believe we are correct in stating that there is no present intention of interfering with the price of gas.—*Oldham Chronicle.*

SUFFOCATION BY GAS.—Richard Purdell, 75 years of age, a shoemaker, of Audlem, Cheshire, was found dead in a bedroom at the District Bank at Accrington on Thursday last. Deceased was on a visit to his daughter, who is in the service of the bank manager. He retired to bed at 9.30 on Wednesday night in good health. One of the servants, on entering his bedroom next morning, found the room full of gas and the deceased dead. He had apparently put out the light and then turned the gas on again, which led to his being suffocated.

PUBLIC LIGHTING AT WAKEFIELD.—At the meeting of the Town Council of Wakefield, on Wednesday, Aug. 7, the corporate seal was affixed to an agreement with the gas company for lighting public lamps within the borough. The number of lighting hours was fixed at 3549, and the amount to be paid to the company is £1547 16s. 7d., as against about £1200 last year. The increase in the amount is owing to an advance of 6d. per 1000 feet in the price of gas.

GAS SUPPLY OF HULL.—Mr. Baynes reports that the quality of the gas supplied by the British Gas Company to the district of Sculcoates and Myton during the month of July was satisfactory, the mean of fifteen experiments, of ten observations each, made at a distance of nearly two miles from the works, showing an intensity of light equal to 14¾ candles; neither free ammonia nor sulphuretted hydrogen were at any time present to the ordinary tests. The results for the month for illuminating power, with Sugg's 15-hole standard burner, and chemical purity are:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	15·28	14·20	14·75
Grains of sulphur per 100 feet	26·40	22 30	23·85
Grains of ammonia per 100 feet	—	—	0·80

Mean barometer and temperature in experiment room:—
Bar. . . . 30·10. Temp. . . . 70.

PUBLIC LIGHTING AT SHEERNESS.—After several months agitation the differences between the Board of Health and the Sheppy Gas Company have been adjusted. At the last meeting of the board, a contract was signed for the supply of the street lights for one year, commencing August 1. The original price paid was £3 16s. per lamp for 365 nights; and on the termination of the contract, on the 31st of March last, the company advanced the price asked by them to £4 6s. per light, in consequence of the increased price of coal. The board demanded to be supplied at £3 per light, under the empty threat of erecting works of their own. The company refused to abate the price asked, but offered to supply by the average meter system, or refer the price to arbitration in accordance with the terms of their special Act, meanwhile continuing the supply from month to month for the summer months at the old rate of charge. The board, finding their threats of erecting new works disregarded by the company, endeavoured to economize by a plan for lighting two hours after sunset and extinguishing two hours before sunrise, and not lighting for three nights at each full moon. After many letters had passed the company offered to supply 365 nights for £4 6s., or 326 nights for £4; but refused the shortening the hours as proposed. Ultimately the offer of £4 per light for 326 lights was accepted.

PROPOSED PURCHASE OF THE WINCHESTER GAS AND WATER WORKS BY THE CORPORATION.—At the quarterly meeting of the Town Council, on the 1st inst., the clerk read a communication received from the secretary of the gas and water company, from which it appeared that the directors are disposed to advise the shareholders to sell the undertaking to the local board, upon the principle that the price to be paid be settled by arbitration. The committee had resolved that it be recommended to the board to decline to negotiate upon the basis of arbitration; but that, if the company will state the sum required for the purchase of their undertaking, the board will be willing to consider the proposition. The board request the company to name distinct sums for the gas and water works, and to state whether they would dispose of the same separately.

HECKMONDWIKE.—PROPOSED PURCHASE OF THE GAS-WORKS BY THE LOCAL BOARD.—On Tuesday, July 30, a public meeting was held in the Freemasons Hall, Heckmondwike, for the purpose of considering the propriety of authorizing the Local Board of Health to purchase the works and plant of the Heckmondwike Gas Company. The chair was occupied by Mr. George Burnley, chairman of the Board of Health. Mr. Leadbeater proposed—"That this meeting approves of and confirms the resolution passed by the Local Board of Health—namely, that it is expedient for this board to purchase, on behalf of the ratepayers, the works and plant of the Heckmondwike Gas Company." The proposition was seconded by Mr. E. Moffatt, and carried with only one dissentient. A resolution was also passed, on the motion of Mr. W. Archer, seconded by Mr. T. B. Oldfield, by which the board were authorized to give their best and immediate attention to the consideration and completion of an agreement with the

gas company, subject to the approval of the ratepayers, for carrying out the purchase.

THE RYDE GAS-WORKS QUESTION.—The *Hampshire Advertiser* says: "The following list of accounts in connexion with the gas arbitration expenses have been sent to the local board. This is exclusive of the gas company's expenses, which they threaten to make the town pay:—Marvin, £47 14s. 7d.; Hellyer, £49 15s. 7d.; Newman, £58 16s.; Clift, £184; Richards, £193 14s. 6d.; Cleminshaw, £210; Andrews, £219 15s.; Jones, £230 5s. 6d.; Clarke, £152 10s.; Stevenson, £657 4s. 3d.; Umpire and Arbiters, £514 3s. 6d.; Solicitors, £122 15s. 10d.; Committee, £200; total, £2840 14s. 9d." The following announcement has been issued by the Ryde Ratepayers Association:—

"*Defeat of the Town Council.*

"To the Ratepayers.—The following satisfactory reply has been received from the Local Government Board in answer to a communication from the Ratepayers Committee, showing that in the face of the opposition of the Ratepayers Association the provisional order issued will not be laid before Parliament, and consequently the general body of ratepayers will be saved from an award, which Mr. Stevenson, the experienced valuer, asserts was 'so monstrous in its amount that if acted upon it would place a most onerous and burdensome weight upon the town of Ryde for all time to come.'

"It will not be necessary, in consequence, for the ratepayers to petition.

"W. S. ARNOLD, Hon. Sec."

"*Local Government Board, Whitehall, S.W., July* 27, 1872.

"PROVISIONAL ORDER.

"Sir,—I am directed by the Local Government Board to acknowledge the receipt of your telegram, received on the 26th inst., and to state in reply that the board have already informed Messrs. Dorington and Co., the parliamentary agents acting for the Ratepayers Association and owners of property in the borough of Ryde, that, as instructions have been given for the preparation of petitions against the bill confirming the provisional order issued to that borough, with the view to its opposition in Parliament, it is not the intention of the board to introduce the bill in question.

(Signed) "W. G. LUMLEY, Assistant Secretary.

"Henry Knight, Esq., Union Street, Ryde, I.W."

KILMARNOCK GAS COMPANY.—The annual meeting of shareholders was held on the 30th ult., Mr. Peter Sturrock presiding. The secretary (Mr. J. S. Gregory) read the annual report, from which it appeared that the profit in the company's operations during the past year amounted to £2938 14s. 4d., out of which the directors recommended payment of an interim dividend at the rate of 7½ per cent. per annum on the original stock, and the full dividend at the same rate on the new stock, less income-tax, payable on the 1st of August next. This would leave a balance on hand of £1138 14s. 4d. to meet whatever liabilities might be due by the company. The final balance, if any, would be divisable wholly among the holders of original stock. During the year one of the gasholders was partially blown over and damaged, and the cost of restoring it, from £400 to £500, might fall to be deducted from the balance should the company under the agreement with the Corporation be found liable for casualities occurring to the works since the date of the sale. The action against Messrs. Smith, lately the chemical tenants of the company, was still before the court, the defenders having appealed to the Court of Session, and the final winding-up of the company's affairs would thereby be delayed. The purchase price of the works, £36,000, was paid over by the Corporation on the 14th of June last. On the motion of the chairman, seconded by ex-provost Donald, the report was unanimously agreed to. The retiring directors were re-elected to remain in office till the company's business was finally concluded. The arrangement of the Corporation's claim with regard to the damaged holder was left in the hands of the directors.

BREAKING PUBLIC LAMPS AT EDINBURGH.—At the Police Court, on the 1st. inst., before Bailie Lewis, Peter M'Call was charged with having broken a public lamp at Haymarket Terrace, on the 11th ult., and thus with having caused damage to the amount of £1 13s. 6d. The accused admitted the charge, but said the accident was occasioned by the road engine used by the City Road Trust frightening the horse in a van which he was driving at the time. He was ordered to pay 18s. of mitigated damages. William Sutherland pleaded guilty to having allowed a lorry under his charge to break a public lamp in South Bridge on the 20th ult. The damage done in this instance amounted to £1 1s. 8d. Sutherland stated that a tramway car come in contact with his cart, and drove it against the lamp-post. The space between the rail and the pavement was very narrow. He was ordered to pay 5s. of mitigated damages. Being unable to do, he was sent to the cells for twenty-four hours.

DAMAGE BY THE STORM AT THE DAWSHOLM (GLASGOW) GAS-WORKS.—Early on Saturday morning, July 27, rain began to fall here with great violence. The Kelvin overflowed its banks, sweeping trees and rubbish before it. The drains and common sewers in the district got choked up, and the road near Canniesburn was covered at several points. Work was suspended at a number of the collieries and foundries during the day. Considerable apprehension was entertained for the safety of the new City Gas-Works at Dawsholm. The works are situated in a hollow by the side of the Kelvin, and immediately south of the North British line of railway to Helensburgh. A large tank for the gasometer is in course of construction. It is 20 feet in depth and 163 feet in diameter, and before the flood the wall had been built a height of 8 feet two-thirds round the circumference. The rain from the high ground rushed down into the hollow, as did also a stream, 6 inches in depth, from the railway, and by six o'clock in the morning the water was about 6 feet deep in the tank. A centrifugal steam pump, which had been erected in case of any emergency arising, was set going as soon as the day shift arrived to commence work, while hand pumps and other contrivances for getting rid of the water were also brought into requisition. The embankment had also given way at various places, and a good deal of loss has been sustained, but the progress of the work will not be materially delayed.

EXPERIMENTS ON THE SIMULTANEOUS LIGHTING OF LAMPS.—Some experiments were made at Preston a fortnight ago with Klinkerfue's "Hydrostatic-Galvanic Igniter." We made a brief allusion to this invention some months since, and may shortly give a detailed description, with illustrations, without which a description would hardly be intelligible. It has been patented in England by Mr. J. B. Booth, of Preston. The apparatus consists of a glass vessel, in which is contained a galvanic pair of zinc and graphite, the poles of which are two small brass rods, carried a little above the burner, and connected by a spiral of platinum wire placed across the burner. The gas is conveyed to the vessel by means of a tube in the centre, closed at the top, and placed within another wider tube, which again is put within a third, which leads to the burner. The exciting liquid is a solution of bichromate of potash in dilute sulphuric acid. Sufficient of this is placed in the vessel so that when the gas is at the minimum pressure the level of the liquid stands above the opening of the middle tube, thus forming an hydraulic valve, which prevents the passage of gas to the burner. When, however, the pressure of gas is increased the liquid is depressed in this tube (so allowing the gas to pass), and forced up in the outer vessel, when, reaching the zinc (the carbon being already immersed), a galvanic current is established, the platinum spiral is rendered white hot, and the gas ignited. By means of an apparatus of this sort applied to every lamp the gas can be lighted simultaneously over a whole city. The experiments at Preston are reported to have been very successful.

LINCOLN WATER-WORKS PURCHASE.—It is stated that negociations are in process for obtaining the £70,000 required for the water-works purchase from the Bank of England at 4½ per cent. per annum, payable in thirty years, but the annual interest and principal to be calculated as if for fifty years, as that at the end of thirty years the balance will either have to be paid off, or fresh arrangements entered into. The last negotiation collapsed.

CONVICTION FOR WASTING WATER.—At the Liverpool Police Court, on the 6th inst., four owners of property were summoned for allowing a waste of water on their premises through defective pipes, and fines of 10s. and costs to 20s. and costs were imposed.

WAKEFIELD WATER-WORKS COMPANY.—The twenty-first half-yearly meeting of the shareholders of the above company was held on the 2nd inst. Mr. W. Stewart, solicitor (and one of the directors), presided, in the absence of Mr. W. Statter, the chairman, who has been accidentally injured. The directors, in their report, recommended that a dividend of £9 per cent. per annum should be paid clear of income-tax, leaving a surplus of £94 8s. 6d. to carry to the reserve-fund. The report was unanimously adopted. On the recommendation of the directors, the shareholders sanctioned an increase of £25 per year in the salary Mr. John Sykes, the secretary. Ald. Watson moved, and Mr. W. Taylor seconded, a resolution recommending the directors to increase the salary of Mr. T. Rayner, the collector, by £15 per year, and Mr. Connor, clerk, by £10 per year.

BERMONDSEY WATER SUPPLY.—Major Bolton, water examiner to the Board of Trade, in a further report on the recent failure in the water supply of Bermondsey, says: "From the inquiries I have made I fail to ascertain that any dearth of water existed in Bermondsey except, as already reported, on the 14th, 15th, and 16th of June, when the water company delivered a short supply, consequent upon the choking up of the filter-beds by rapid vegetable growth. I would suggest that the Board of Trade should call upon the vestries to furnish the reports of the medical officers of Bermondsey and Rotherhithe as to the state of the health of their respective parishes. The district of Bermondsey appears to be amply supplied with water by the water company at the present time; but I have no doubt that many individuals suffer inconvenience from the defective construction and bad state of the house fittings. The Southwark and Vauxhall Company are prepared, however, to put up stand-pipes on their mains, at any place and at any time, upon receiving application from any resident in the district who, from imperfect fittings, may be unable to obtain a supply in his own house."

LAMBETH WATER SUPPLY.—On Tuesday last the directors of the Lambeth Water-Works opened a new source of supply at West Moulsey, by which the whole of their intake will for the future be obtained from a part of the Thames considerably above the entrance of the Mole. The frequent muddiness of the Lambeth water during the last few years has been mainly due to the unfavourable position of the intake at Thames Ditton. This was situated near to and below the Mole; a stream not only very much polluted in various ways, and very liable to be rendered turbid from the soil through which it passes, but which also hugs the south bank of the Thames for considerable distance. Practically, therefore, the Lambeth Company received Mole water rather than Thames water; and their resources in the way of subsidence reservoirs and filtering beds were not sufficient to remove even the gross and visible impurities of the supply. In November, 1870, however, arrangements were made to seek power from Parliament to remove the intake to West Moulsey, and in July, 1871, the necessary Act received the Royal Assent. The work was commenced in the following September, and has thus been completed in about eleven months. The total length of the new conduit, from the river bank at West Moulsey to the old reservoirs at Ditton, is about three miles and a half. Of this length the two portions which pass through the villages of East Moulsey and Thames Ditton, measuring respectively 800 yards, and 550 yards, are formed of iron pipes, strongly cemented at the joints, and intended to exclude the possibility of any contamination of the water by leakage of sewage matters from the subsoil. The rest is in brickwork of oval form, measuring 5 ft. 9 in. in the vertical and 4 ft 9 in. in the horizontal diameter. For the first mile the conduit is level, and in the rest of its course it falls three feet. This inclination is sufficient to enable it to deliver, by gravitation alone, twenty millions of gallons of water daily, and as the fall of the Thames between the points of inlet and discharge varies from seven to eight feet according to the state of the river, there remains a gain of from three to four feet in the height to which the reservoirs at Ditton can now be filled. The inequalities of the surface cause the depth of the conduit to vary from ten to thirty feet. The first half mile is carried under fields between the river and the West Moulsey road, and at East Moulsey a short portion is carried under fields at a point where it passes beneath the Rivers Mole and Ember; but the rest of the work is entirely beneath public roads, and is rendered easily accessible by shafts and man-holes in convenient situations. The plans of the new conduit were designed by Mr. John Taylor, the company's engineer, and the work has been carried out with great efficiency and punctuality by Messrs. Aird and Sons, the contractors. The total cost has been about £50,000.

THE BLACKBURN SEWAGE QUESTION.—Mr. Manisty, Q.C., the arbitrator appointed in the cause of *Sir W. Fielden v. The Corporation of Blackburn*, has made his second award against the defendants for fouling the river Blakewater, which passes by the plaintiff's residence. In the first award the plaintiff obtained £1250 and costs, and in the second instance £300 and costs.

THE PURIFICATION OF THE THAMES.—For several years past the local authorities of Kingston-on-Thames, Hampton Wick, Teddington, East Moulsey, Richmond, Twickenham, Isleworth, Mortlake, and Brentford have been under imperative orders from the Thames Conservators to divert the sewage of their respective towns from the river Thames. In consequence of the great diversity of opinion amongst scientific men as to the best means of dealing with town sewage—some recommending irrigation, others filtration, and a third class deodorization—as well as owing to the difficulty of obtaining land for the utilization of the sewage, no definite action has hitherto been taken, although the authorities of Kingston and Richmond have spent several hundreds of pounds in vainly endeavouring to procure eligible sites for irrigation fields. The conservators, it appears, have decided to wait no longer for preliminary investigations and experiments, for last week the Twickenham Local Board was informed that unless they take immediate steps for the diversion of the town sewage from the river, the conservators will proceed against them for penalties. The fine for non-compliance with the order of the conservators is £100 per day.

Price Current.

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign.—*	Per Keel.
Chatham and Rochester	7s. 3d	Barcelona	£36 to
Cork	12 0	Bordeaux	£12 to 13 0
Dover, Folkestone, & Ramsgate	8s. 6d. to 9 0	Boulogne and Calais	10 0
Dublin	8 6	Cadiz	£12 to 13 0
Exeter Quay	9 0	Cronstadt	12 10
Ipswich	6 9	Copenhagen	13 0
London (from Leith)	—	Genoa	24 10
London (Pool)	7s. 6d. to 8 0	Hamburg	10 10
Lowestoft and Yarmouth	8 0	Havre de Grace	12 10
Portsmouth & Southampton	10 6	Leghorn	24 10
Plymouth	12 0	Lisbon	14 0
Shoreham	8 0	Rotterdam	10 10
Whitstable	8 6	Stettin	14 0
Weymouth	7 6	Trieste	22 0
		Venice	25 0

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	23 — 24
5000	20	Bahia (Limited)	20 0 0	3 0 0	11¼— 12½
1000	20	Do., preference	20 0 0	10 0 0	23 — 25
750	20	Do., do., redeemable	20 0 0	10 0 0	21 — 23
40000	5	Bombay (Limited)	5 0 0	6 15 0	5½— 6
10000	5	Do., third issue	4 0 0	6 15 0	¼—½ pm.
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	35 — 36
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19 — 20
120000	10	*Chartered* A shares	10 0 0	10 0 0	15¾— 16¼
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	7 — 7½
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	13 — 14
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	3¼—3¾ pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 — 20
12000	25	Do., D shares	25 0 0	10 0 0	49 — 50
17490	100	*Commercial*	100 0 0	10 0 0	168 —171
20000	20	Continental Union	20 0 0	8 0 0	22 — 24
10000	20	Do., new	10 0 0	8 0 0	2 —3 pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	23 — 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16½— 17½
5000	10	Do., preference	10 0 0	6 0 0	11½— 12
6624	10	Do., new shares	10 0 0	7 0 0	13¾— 14¼
3376	10	Do.	1 0 0	7 0 0	1—1½ pm.
23406	10	European (Limited)	10 0 0	8 0 0	15 — 16
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	8 0 0	3 — 3½
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	12½— 13½
1560000	100	*Imperial*	100 0 0	10 0 0	168 —170
26000	12½	Do., new shares	12 10 0	7 0 0	16 — 16½
25000	12½	Do., new shares, 1870	12 10 0	7 0 0	15½— 16
1300	100	Do., bonds	£100	10 0 0	195 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	64 — 66
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	66 — 68
3000	10	Do.	10 0 0	5 0 0	7½— 8½
3000	20	Do.	20 0 0	7 10 0	24½— 25½
250000	Sk.	*London*	100 0 0	10 0 0	163 —166
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 —120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
8000	10	Nictheroy, Brazil (Limited)	10 0 0		1½—½ dis.
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3¾— 4
6000	5	Do., preference	5 0 0	7 0 0	5½— 5¾
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2¼— 2⅜
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7¼— 7½
30000	5	Do., new shares	2 10 0	9 0 0	1¼—1⅜ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2¼
17500	10	Parà (Limited)	10 0 0	6 0 0	10 — 10½
27000	20	*Phœnix*	20 0 0	10 0 0	33½— 34½
3600007.	100	Do., new	45 0 0	7 10 0	14—16 pm.
1440007.	Sk.	Do.	100 0 0	5 0 0	89 — 91
5000	20	*Ratcliff*	20 0 0	10 0 0	33 — 35
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	34 — 36
7359	5	Singapore (Limited)	5 0 0	7 0 0	5 — 5¼
2000	5	Do., preference	5 0 0	7 10 0	5½— 6
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	88 — 90
4000	12½	Do.	12 10 0	10 0 0	22 — 24
20000	12½	Do., new shares	2 10 0	10 0 0	4¼—5 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16 — 17
10000	10	Do., new	6 0 0	10 0 0	4½— 5½
9000	4	United General (Limerick)	4 0 0	5 0 0	3 — 3¼
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	13 — 14
1500	10	Do.	10 0 0	7 10 0	7½— 8
1819	10	Do.	10 0 0	7 10 0	
1188	10	Do.	5 0 0	7 10 0	
40000	10	Western (Limited) A, B, & C shares	10 0 0	10 0 0	16 — 17
20000	10	Do., D shares	1 0 0	10 0 0	3½—4 pm.
16000	5	*West Ham*	5 0 0	9 0 0	7¼— 7½
10000	5	Do., new shares	1 0 0	9 0 0	1½— 1¾
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

Register of New Patents.

2451.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in cocks or valves.*" A communication. Provisional protection only obtained. Dated Sept. 16, 1871.

The improvements relate to a cock provided with a disc, having an aperture for the passage of the liquid, arranged to fill a cylindrical casing and operated by a central stem, this disc being adjusted to prevent leakage, by a screw. Suitable inlet and outlet passages are provided on the casing. In a modified arrangement the disc has two openings communicating with tubular chambers (forming the inlet and outlet) on being rotated by a central stem as before.

2462.—William Pawson, of Westgate, Grantham, in the co. of Lincoln, plumber, for "*Improvements in taps or valves for hot and cold water apparatus.*" Patent dated Sept. 19, 1871.

These improvements relate chiefly to the employment of a loose and separate seating of rubber or other elastic material in hot or cold water taps or valves, which seating fits into a recess or chamber and is acted upon by a spring or other valve for closing the passage.

2469.—Charles Pinn, of Friars Green, in the parish of Holy Trinity, and of Queen Street, in the parish of St. David's, in the city of Exeter, for "*An improved apparatus for preventing waste of water in dwelling-houses and other buildings where water is supplied by pipes.*" Patent dated Sept. 19, 1871.

This invention consists in applying to the water supply-pipe of a house, building, or other premises, or to a pipe or pipes conveying water to the supply-taps of a house, building, or other premises, a valve having a lever or vessel attached thereto, which will close by the waste water flowing into it, and be reopened by overturning the said vessel and discharging its load by means of a lever.

2470.—John Owen, of Bowden, in the co. of Chester, for "*Improvements in the construction of high-pressure filters.*" Patent dated Sept. 20, 1871.

The invention consists principally of a long cylinder having at each end a hemispherical cup screwed on. Each cup is provided with a short junction pipe, by means of which it is connected with the supply pipe at each end, so that all the water passing along the pipe must necessarily pass through the filter. Each cup contains a piece of sponge pressed in closely, and between it and the cylinder is a piece of felt protected by a gird or perforated metal plate. The cylinder itself is filled with charcoal, a layer of coarse at each end, and fine charcoal in the centre.

2481.—Francis Parry, of 102, Piccadilly, in the co. of Middlesex, gentleman, for "*Improvements in apparatus for drying precipitated sewage and other like substances.*" Patent dated Sept. 21, 1871.

This invention relates to improvements on the invention for which provisional protection was granted to the same patentee, bearing date the 25th of August last, No. 2233, and consists essentially in disposing a flat plate or cover, perforated or otherwise, close to the surface of the mud or other substance to be dried. If desired, this flat cover may be made hollow so as to form a top chamber, and be perforated on its underside to admit hot air or steam therein and direct it through the perforations down upon the surface of the mud. The said flat plate or cover be applied either to rotary or to a stationary receptacle; in the latter case there will be a sand joint or other convenient tight joint formed between the edges of the flat plate or cover and the sides or edges of the receptacle to prevent any escape of effluvium or loss of the hot air or steam employed in drying the mud.

2495.—James Banks, of Liverpool, in the co. of Lancaster, iron fence manufacturer, and William Walker, of the same place, consulting engineer, for "*An improved system for the treatment of sewage, parts of which are applicable to the filtration of water for the use of towns, and other liquids on an extensive scale, and apparatus therefor.*" Patent dated Sept. 22, 1871.

This invention consists in treating sewage in a systematic manner, separating the aqueous from more solid portions by means of floating filters placed in a series of tanks, which floating filters are applicable to the filtration of water from the rivers and lakes for general purposes. Also in a means of withdrawing the more solid matter from the tanks, and apparatus for treating the same and mechanically adding other substances. Also in a method of aerating the filtered liquid and making use of the current in the sewer for operating the working parts of the apparatus, and using the stream in which said filters in rivers are moored for elevating and discharging the filtered water.

2497.—John Williamson, of No. 25, Warren Street, Stockport, in the co. of Chester, and William Glazier, of No. 235, Drake Street, Rochdale, in the co. of Lancaster, for "*Improvements in dry closets of privies and commodes, and apparatus to be used therewith.*" Patent dated Sept. 22, 1871.

This invention relates to the collection of excreta in dry closets, privies, and commodes, and especially in those in which ashes, dry earth, or other absorbent material is used, and consists in absorbing the urine separately and distributing powder over the fæces by means of a current of air as hereafter described.

The excreta are received in a receptacle divided by a moveable partition in two compartments, the front compartment is charged with absorbent material and receives the urine, and the back compartment receives fæces over which powder is distributed by means of bellows or other suitable pneumatic arrangement combined with a hopper and worked in any suitable way.

Instead of the bellows a pneumatic arrangement, constructed as follows, may be used. The said arrangement consists of a cylinder at one end of which is affixed a pipe leading to the hopper, the other end being closed by a sheet of india-rubber capable of being stretched inwards or outwards by means of a spindle suitably worked. Air enters the said cylinder through an inlet valve.

2507.—Niels Ludvig Martinus Smith, of the city of Glasgow, in the co. of Lanark, North Britain, engineer, for "*A new water meter or rotary wheel or machine, suitable also as an air and gas blower or exhauster, and as a pump for raising or forcing liquids, and as a hydraulic or steam motor.*" Provisional protection only obtained. Dated Sept. 22, 1871.

This invention consists of a new rotary meter, or wheel, suitable also for being applied as an air or gas exhauster or blower, or as a water pump, or as a hydraulic or steam motor. The nature and construction of which is as follows:—Within a hollow cylinder—made by preference with its outer casing or perimeter in two parts with disc end covers—a cylindrical barrel piston—with two thin broad vanes passed radially and longitudinally through its axis at right angles to each other, so as to slide in corresponding slots as the pressure acting pistons of the said barrel piston—is made to revolve close up to a quarter circular segment in the upper part of the outer casing and a short distance into close cylindrical recesses in the end covers; with the pressure inlet duct and port entering into one side and the outlet port and duct passing out on the other side of the actual acting part of the cylinder, made in the form of a concentric or segmental hollow cylinder, below the barrel of the piston, so that the projecting four ends of the said two sliding and acting pistons, as they come round to this large segmental part (formed for about a third of its circle in the lower part of the outer casing) fill and close the space while passing through it; the length of the sliding pistons being equal to the radius of the small upper arc, and that of the large lower segment taken together, and the parts of the interior of the cylinder, at the side and inlet and outlet ports, are made to curve tangentially from the ends of the small arc to those of the large arc, with clearance enough to allow the acting pistons to slide over and project into and fill the cylindrical space as they come round; the one never opening the acting space on the exhaust side until the one on the inlet side has entered the acting space, so that the pressure on the entering side drives the piston, and every revolution passes four times the quantity of water contained between two of the projecting vanes within the segmental acting space; a spindle passing out through a stuffing box in one of the end covers, and connected to an ordinary indicator, and its train of wheels would indicate the said quantity delivered or passed through the meter in gallons in the usual manner. When used as a pump, or water meter, a strong actuating shaft, from the solid ends of the piston barrel, could be passed out, through stuffing box bearings in the end of the cylinder.

APPLICATIONS FOR LETTERS PATENT.

2232.—William Rose, of Halesowen, in the co. of Worcester, gentleman, for "*Improvements in steam-boiler furnaces, puddling furnaces, and furnaces for heating retorts for the manufacture of gas, which improvements may also be applied to other kinds of furnaces.*" July 26, 1872.

2236.—Frederick William Hartley, of 55, Millbank Street, Westminster, in the co. of Middlesex, gas engineer, for "*Improvements in regulating the pressure and delivery of gas, and in apparatus therefor.*" July 26, 1872.

2247.—Thomas Mortlock, of Shafton Road, South Hackney, in the co. of Middlesex, for "*Improvements in irons, applicable also for gas-stoves for domestic purposes.*" July 27, 1872.

2262.—Thomas Russell Crampton, of Great George Street, Westminster, in the co. of Middlesex, for "*Improvements in the manufacture of gas and fuel, and in apparatus to be used for this purpose.*" July 29, 1872.
2264.—John Prentis Hawley, of Brixton, in the co. of Surrey, A.I.C.E., for "*Improvements in cocks and sluices.*" July 29, 1872.
2268.—William Morgan Brown, of the firm of Brandon and Morgan Brown, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris, engineers and patent agents, for "*Improvements in apparatus for raising water.*" A communication. (Complete specification.) July 30, 1872.
2276.—William Benjamin George Bennett, of 92, Nichols Square, Hackney Road, in the co. of Middlesex, engineer, and James Charles Watt, of 216, Lancaster Road, Notting Hill, in the said co. of Middlesex, gentleman, for "*Improvements in the preparation of asphalte, and in the application thereof to the construction of roads and footpaths, and other purposes.*" July 30, 1872.
2279.—Isaac Brown, of Elm Croft Grange, Edinburgh, in the co. of Mid Lothian, N.B., for "*Improvements in the treatment of sewage and in the manufacturing of manures.*" July 30, 1872.
2280.—John Henry Johnson, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in water-meters.*" A communication. July 30, 1872.
2283.—Benjamin Joseph Barnard Mills, of the firm of Harris and Mills, of 35, Southampton Buildings, in the co. of Middlesex, patent agent, for "*Certain improvements in rotary engines and pumps.*" A communication. (Complete specification.) July 30, 1872.
2292.—Alfred Tylor, of 2, Newgate Street, in the City of London, brass-founder, for "*Improvements in apparatus and arrangements for the water supply of water-closets and baths, and preventing waste, applicable also in whole or in part for controlling, regulating, and arresting the flow of liquids and fluids, and preventing waste.*" July 31, 1872.
2296.—George Haseltine, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in machines for the manufacture of gas.*" A communication. Aug. 1, 1872.
2303.—Edward Gregson Banner, of 11, Billiter Square, in the City of London, for "*Improvements in traps for preventing the passage of noxious gases from sewers or drains through pipes communicating therewith.*" Aug. 1, 1872.
2312.—George Guillaume André, of Dorking, in the co. of Surrey, civil engineer, for "*Improvements in raising or forcing water from mines, wells, or other places, and in apparatus therefor.*" Aug. 2, 1872.
2324.—William Edward Gedge, of 11, Wellington Street, Strand, in the co. of Middlesex, patent agent, for "*An improved portable pump.*" A communication. Aug. 3, 1872.
2335.—George Bray, of Leeds, in the co. of York, enamel gas-burner manufacturer, for "*Improvements in gas-burners.*" Aug. 6, 1872.
2362.—Saul Myers, of Vale Terrace, Sutherland Gardens, Maida Vale, in the co. of Middlesex, for "*Improvements in gas-lighting apparatus.*" A communication. Aug. 8, 1872.

GRANTS OF PROVISIONAL PROTECTION.

2036.—Etienne Jules Lafond Caillot, of Barcelona, Spain, chemist, for "*Improvements in the manufacture of lighting and heating gas, and in apparatus and burners connected therewith.*" July 5, 1872.
2090.—James Chandler, of 17, Cottage Grove, Mile End Road, in the co. of Middlesex, engineer, for "*Improvements in bath and other apparatus for the control of water and preventing waste thereof.*" July 11, 1872.
2194.—Henry Sutcliffe and Wright Sutcliffe, of Halifax, in the co. of York, sanitary engineers, for "*Improvements in moulding or constructing stench-traps or syphon-pipes.*" July 23, 1872.
2195.—William Thomas Thompson, of 85, Gracechurch Street, in the City of London, for "*An improved ventilating, disinfecting, and deodorizing apparatus.*" July 23, 1872.
2202.—Jules Cordier, of 12, Rue de Marseille, Paris, France, manufacturer, for "*Improvements in the mode of reflecting, projecting, and diffusing light by means of globe reflectors.*" July 24, 1872.
2227.—Millington Henry Synge, of the United Service Club, Pall Mall, in the co. of Middlesex, colonel, Royal Engineers, for "*Improvements in deodorizing apparatus.*" July 25, 1872.
2232.—William Rose, of Halesowen, in the co. of Worcester, gentleman, for "*Improvements in steam-boiler furnaces, puddling furnaces, and furnaces for heating retorts for the manufacture of gas, which improvements may also be applied to other kinds of furnaces.*" July 26, 1872.
2236.—Frederick William Hartley, of 55, Millbank Street, Westminster, in the co. of Middlesex, gas engineer, for "*Improvements in regulating the pressure and delivery of gas, and in apparatus therefor.*" July 26, 1872.
2262.—Thomas Russell Crampton, of Great George Street, Westminster, in the co. of Middlesex, for "*Improvements in the manufacture of gas and fuel, and in apparatus to be used for this purpose.*" July 27, 1872.
2264.—John Prentis Hawley, of Brixton, in the co. of Surrey, A.I.C.E., for "*Improvements in cocks and sluices.*" July 27, 1872.
2279.—Isaac Brown, of Elm Croft Grange, Edinburgh, in the co. of Mid Lothian, N.B., for "*Improvements in the treatment of sewage and in the manufacturing of manures.*" July 30, 1872.
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2303.—Edward Gregson Banner, of 11, Billiter Square, in the City of London, for "*Improvements in traps for preventing the passage of noxious gases from sewers or drains through pipes communicating therewith.*" Aug. 1, 1872.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF A COMPLETE SPECIFICATION.

2268.—William Morgan Brown, of the firm of Brandon and Morgan Brown, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris, engineers and patent agents, for "*Improvements in apparatus for raising water.*" A communication. July 30, 1872.
2283.—Benjamin Joseph Barnard Mills, of the firm of Harris and Mills, of 35, Southampton Buildings, in the co of Middlesex, patent agent, for "*Certain improvements in rotary engines and pumps.*" A communication. July 30, 1872.

NOTICES TO PROCEED.

811.—Henry Phillips, of Heavitree, Exeter, in the co. of Devon, for "*Improvements in dry closets.*" March 18, 1872.
816.—Charles Joseph Temple, of New Cross, in the co. of Surrey, and Robert Skirrow Danter, of Holloway Road, in the co. of Middlesex, for "*An improved union joint or coupling for hose and other pipes.*" A communication. March 18, 1872.
859.—John Hopkinson the elder and John Hopkinson the younger, both of Manchester, in the co. of Lancaster, engineers, for "*Improvements in the construction of street-lamps.*" March 21, 1872.
920.—Charles Robert Mathews, of 52, High Street, Bloomsbury, in the co. of Middlesex, gas engineer and gas lantern and lamp manufacturer, for "*Improvements in apparatus for safe, speedy, and easy mode in fixing, connecting, and disconnecting gas-pendant, bracket, pillar or ground connexions, especially adapted for outside reflecting lamps.*" March 26, 1872.
1999.—John Wallace, of 16, Grove Villas, Grove Street Road, N.E., for "*Improvements in gas-stoves and burners, and regulating apparatus to be used in connexion therewith.*" July 2, 1872.

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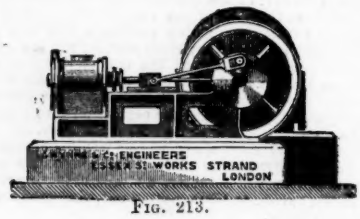

Fig. 213.

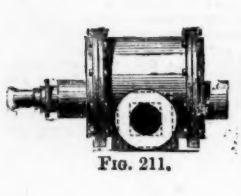

Fig. 211.

Fig. 219.

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Fig. 213 shows the Improved Gas-Exhauster attached to, and driven by one of Gwynne and Co.'s well-known high-speed Horizontal Steam-Engines, without any intermediate gearing. This arrangement is extremely compact, and is beautifully adapted for small or large Gas-Works, and the foundations and erection are both very simple and inexpensive.

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CONTENTS.

Notes upon Passing Events:— PAGE
The British Association . . . 721
Science Teaching at Public Schools . . . 721
Dr. Carpenter's Career . . . 721
Scientific Geography . . . 721
Dr. Smith on Preserved Foods . . . 721
The Woolwich System of Rifling Artillery . . . 722
The Higher Education of Women . . . 722
Railway Management . . . 723
Sabbath Recreation . . . 723

Correspondence:—
On Mr. R. H. Jones's Plan for the Collection of Gas Accounts . . . 723

Circular to Gas Companies:—
The Accounts of the Metropolitan Gas Companies for 1871 . . . 726
The Patent Gas Company . . . 726
The Amalgamation of the Western and Chartered Companies . . . 727
Gas Affairs at Ryde . . . 727
Advances in the Price of Gas . . . 727

Parliamentary Intelligence:—
Municipal Corporations (Borough Funds) Act . . . 727

Miscellaneous News:—
Hull Water Supply . . . 723
South Metropolitan Gaslight and Coke Company . . . 727
Meeting of The Gaslight and Coke Company . . . 728
Meeting of the Imperial Gas Company . . . 728
Meeting of the Western Gas Company . . . 731
Meeting of the Alum and Ammonia Company . . . 735
Meeting of the Liverpool United Gas Company . . . 735
Forfar Gas Corporation . . . 735
Faversham Gas Company . . . 735
Meeting of the Edinburgh and District Water Trust . . . 736
North British Association of Gas Managers . . . 736
Regulations under the Metropolis Water Act, 1871 . . . 737
Colombo Gas and Water Company . . . 738
Elland Gas Company . . . 738
Andover Gas Company . . . 738
Melton Mowbray Gas Company . . . 738
Rochester and Chatham Gas Company . . . 738
Monmouth Gas Company . . . 738
Barnstaple Gas Company . . . 738
Huntingdon and Godmanchester Gas Company . . . 739
Dr. Whitmore's Report on the Quality of the Water supplied in St. Marylebone, in July, 1872 . . . 739
Dr. Whitmore's Report on the Quality of the Gas supplied in St. Marylebone, in July, 1872 . . . 739
Public Lighting at Swansea . . . 739
The New Offices of the Sheffield Gas Company . . . 739
Greenock New Gas-Works . . . 739
Lamplighters Strike at Edinburgh . . . 739
Gas Explosion in Paris . . . 740
Robbery at the Birmingham Gas-Works . . . 740
Cambridge University and Town Water-Works Company . . . 740

TO CORRESPONDENTS.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 27, 1872.

Notes upon Passing Events.

THE meetings of the British Association are "events" which are justly attracting more attention than anything else, not excepting the military manœuvres, at this dull time, when the "Thunderer" is obliged to fill large type columns with reviews of books of no enduring interest. Passing over the almost exhausted subject of Dr. Livingstone, after, with shame, noting the vulgarity of the doctors who insulted the heroic Stanley—the man who did it whilst others talked—we may safely say that educational questions assumed the most important position in the discussions of this learned society. Dr. Burdon-Sanderson, the President of the Department of Anatomy and Physiology, made some very pregnant remarks on the floundering attempts to introduce science into our public school education. He observed that—

> The teachers of physiology to medical students know that when they begin first to talk to them about the principles of the subject—*e.g.*, about chemical change as the essential condition of vital phenomena; about the sources of animal heat, and the relation between the production of heat and of external motion, or any similar subject; the great difficulty is that their auditors are utterly at fault for want of those fundamental conceptions about matter and its powers, which are expressed in the commonest words—such for example, as solid and liquid, gas and vapour, weight, density, volume, &c., all of which to the average finished schoolboy are perfectly meaningless. The result is that these fundamental conceptions, not having been mastered at first, are not mastered at all, and the student begins to build the superstructure without having had the opportunity of laying the foundation; and thus the whole of the scientific part of his education disappears out of his mind as soon as he enters on the more practical part of his studies.

Then, on the sham attempts at teaching science, he continues:—

> Still some progress is being made in the good schools of London, in the old universities, and in one or two provincial schools great efforts are being made to provide buildings and appliances for the experimental teaching of physiology. Trinity College, Cambridge, has provided for physiologists a place for study and labour, from which already three valuable researches have sprung. . . . Notwithstanding all these efforts, it will take years to regain the position we ought to retain. We still want the pecuniary resources which are necessary for the carrying out of systematic and continuous researches, and, above all, we have still to educate workers. Of the two wants, the want of money and the want of workers, the latter is the more important. The difficulties which lie in our way in this respect are very great indeed. The obvious difficulty—which is always advanced by young men as a reason for not giving up their time to scientific research—is, that it does not pay. But it need scarcely be said that the real difficulty is a more general one. It lies in the practical tendency of the national mind, which leads us Englishmen to underrate or depreciate any kind of knowledge which does not minister directly to personal comfort or advantage—a tendency which was embodied in the philosophy of Bacon, and which has been thought by some to constitute its weakness. No doubt there are many in England who would not be deterred by the prospect of comparative poverty, which in every country must be the part of those who devote themselves to abstract science; but there are very few who have the courage and resolution to follow this course in spite of the public opinion which estimates science on utilitarian principles. These considerations led naturally to the means by which a more enlightened public opinion might be created, by the diffusion of scientific knowledge by means of popular books and lectures. In this connexion Dr. Burdon-Sanderson referred to the popular writings of Professor Huxley, the lectures of Faraday, and the general work of the Royal Institution. He had at one time been disposed to undervalue efforts of this kind, but he was now fully convinced of their real and great utility.

Dr. Carpenter, in returning thanks for the toast of his health, at a dinner of the Medical Society, drew an interesting picture of the change which thirty years had wrought in the position and prospects of men of science. Being the son of Dr. Carpenter, an eminent Unitarian preacher, Oxford was absolutely closed to him. At Cambridge, although he might study, he could not graduate or obtain any of the honours and rewards assigned to classical and mathematical eminence. He graduated at Edinburgh, and there, notwithstanding his admitted claims as a physiologist, he was thrice refused a professorship, on account of his religious opinions. He commenced by practising medicine, and when he desired to devote all his time to science, was obliged to expend nine-tenths of it preparing popular handbooks and lectures in order to have the tenth at his own disposal. Oxford was now open with a profusion of rewards to all opinions. His son was the holder of a scholarship at Trinity College. He himself had just been invited to take a chair in the University of Edinburgh, and to nominate a Professor of Physiology for Cambridge, and had nominated Mr. Foster, a Nonconformist. Something definite will follow discussion before audiences so intelligent and influential. At present, the solid fact remains that at our public schools, which influence the education of the whole country, if a clever and industrious boy chooses to follow the ancient roads of learning, he is sure, without any extra payments or extraordinary trouble, to obtain honours and pecuniary rewards which can be continued to him when he arrives at either of the two wealthy universities. But if his taste lies toward science and those modern languages which contain measures of science, he must commence with extra fees, and be satisfied with barren, or almost barren, honours. Will the time never come when the universities will have and exercise the power of bestowing some of their fellowships, without competition, on the Faradays, the Airys, the Livingstones of the day?

General Strachey, in his paper on the scope of Scientific Geography, contributed his stone to the cairn raised as protest against commonplace not common-sense education:—

> He should not be surprised if to a generation that had not received even an elementary education in physical science the difficulty of realizing his ideal of the scope of scientific geography should appear insuperable. He remarked that as education had until now been conducted, a man who was desirous of devoting himself to scientific exploration was in the position of one who, when entering on a literary career, should find it necessary to begin by learning how to read and write. He, however, looked forward with confidence to the results which would follow when every child was started in life with general but correct conceptions of the fundamental facts and laws of nature. A course of instruction on such an admirable plan as that pursued by Mr. Hale, and explained by him at the last meeting of this section, could not fail, if generally adopted, to turn out young men viewing the earth on which they lived in a totally different spirit and from a totally different stand-point from that of the present generation. And this conception of scientific education, far from excluding the study of man and his history, mental and social, required it as an indispensable portion of the knowledge of surrounding nature. A great statesman in his ignorance and a little statesman in his insolence might assume that men of science, as those who studied physical science were commonly called, were disabled by their researches in the field of nature from comprehending and interpreting humanity. They, on the contrary, held that there could be no true knowledge of man without knowledge of that which was not man, and that it was only when viewed in his true position as one among many phenomena that any accurate conception could be formed of his powers and their limits.

To turn to an entirely different subject, Dr. Edward Smith, F.R.S., and a Poor-Law Inspector on the Local Government

Board, made a tremendous onslaught on those very useful but over-puffed articles—preserved milk, preserved meat, and Liebig's extract of meat:—

Speaking on preserved milk, which was made in England, Switzerland, and America, he pointed out that one pint of the product represented four pints of milk. Four pints of milk would cost, according to locality, from 4d. to 8d., but the "pint tin" of preserved milk held only 16 ozs., and not a pint, which was equal to 20 ozs., and, making allowance for the sugar which was added to the preserved milk, the weight of the preserved milk was about 14 ozs., or two-thirds of a pint, and represented a value of 2⅔d. or 6¼d., according to locality; but the price of the tin of preserved milk was 10d. or 1s., and, therefore, was not an economical, but a dear food. It was, however, he said, a useful invention, in so far as it added to the food of man that which in many localities would otherwise be given to the pigs, and there was every reason to believe that it was most profitable to the manufacturer. Another point he drew attention to was that as sugar was cheaper than preserved milk, and had different and inferior properties, according to the quantity used would the milk value of the compound be reduced, and the temptation to the manufacturer was to use the maximum quantity. The Aylesbury milk contained 2 ozs. in the pound, or 12½ per cent., and it was said that there were other kinds which contained 3 ozs., or nearly 20 per cent. of sugar. It was possible to prepare the "condensed milk," not only with wholly new milk, but with skimmed milk, and with a mixture of the two—skimmed and new. The latter was said to produce the "smoothest" and best preserved milk, and there could be no doubt that a considerable proportion of the cream was first taken from the milk to be pressed in order to make butter. Therefore the product, though of value, was not new milk, and as in the important use of milk—the feeding of infants and young children—the fat was as necessary to nutrition as the caseine and other elements, new unskimmed milk, and not "preserved" milk was required. It was a significant fact, he added, that the milk-condensing companies were also butter makers on a large scale, and competition doubtless would show itself in these directions—increased proportion of water and sugar, and lessened proportion of cream and butter. He closed his remarks on this portion of the subject by pointing out that in preserved milk we have a product of uncertain composition and nutritious value. As to "preserved meat," now so widely known as the "Australian," he described the process of preservation, and stated that six pounds of raw meat, with a proportion of fat, were placed in a tin, which was put into a bath of chloride of calcium, and exposed to a temperature higher than that of boiling water—namely, from 230° to 250°. The tin was soldered and closed, except at one point, where there was a hole through which the steam escaped. The object to be obtained was primarily the expulsion of the air from the tin, and, therefore, the high temperature was required; and, secondly, the cooking of the meat, which, however, might be effected at a much lower temperature. The tin, to prevent too great loss of weight, was "primed" from time to time, so as to keep up the weight of the contents. The circumstances to be remarked in the process were—first, that the meat was neither roasted nor boiled, but stewed in its own vapour; second, that it was overcooked, so that a larger proportion of the soluble materials was extracted than occurred in the ordinary process of boiling, and the solid part was more or less broken up into bundles of fibres; third, the extracted juices were more valuable than from ordinary boiling of meat, and by so much the solid mass was less valuable than ordinary boiled meat; fourth, the peculiar flavour was given partially by the mode of cooking, but chiefly by the addition of the flavour of roasted meat, which was agreeable. The solid matter, although soft, was not easily masticated, since it eluded the grasp of the teeth, and without free mastication it was less perfectly digested. The conclusions to be deduced were classed under different heads. The nutritive value of the whole of the contents of the tin could not be greater than that of the raw meat put into the tin; and hence, although the meat was cooked, the comparison of the value must be with raw meat, and not with cooked meat. If, therefore, a dietary was 4 oz. of cooked meat, the Australian meat would have to be supplied in the same quantity as the raw meat in weight before being cooked—namely, 5½ oz. to 6 oz. He advised that the recommendations laid down by the original importers of the meats should be adhered to in respect of not cooking the meat further than by preparing it in a stew or soup, without more than warming it, and to use it only as a change of food. Respecting Liebig's extract of meat, he pointed out that it was claimed for this that one pound jar represented 32 lbs. of flesh meat. Its composition was water, and, in large quantity, the salt of meat and the phosphates. It contained only the soluble parts of meat, and only such as could be preserved from putrefaction. The fibrine or solid substance of the meat was excluded, for that was insoluble in water. The fat was excluded most carefully, as it would become rancid. Gelatine and albumen were excluded because they would decompose. When, therefore, fibrine, gelatine, and albumen were excluded, it was certainly not "meat" which was left, as the word was understood, for nearly every part of the meat which could be transformed in the body and act as food was excluded; therefore, Liebig's extract of meat was not meat; and to give the meat power the 32 lbs. of meat from which it was said to be taken must be added to it. The product was of less value to the consumer than to the producer, and the preparation was of a delusive rather than a real advantage; but, although he said this, he held that it had a value as a stimulant in the same way as theine or coffeeine; but its economic value was very small as representing 32 lbs. of meat in a pound jar. There had been much misconception respecting the product, for Liebig never affirmed that it was meat, or the equivalent of meat.

In the discussion that followed it was odd to find speakers arguing as if the majority of English beef was fed on oilcake. They were evidently not aware that that very expensive food was never used except as an addition to hay, chaff, roots, or grain. The proprietors of patent milk have since loudly protested against Dr. Smith's statements. They disclaim skimming the milk, but if they employ certain cows, quality will be sacrificed to the quantity of milk.

In the Mechanical Science Section, Mr. Eaton read a paper on "The Application of the Warsop Aëro-Steam System to the "Locomotive Engine," as a means of preventing scale in boilers. The president, Mr. Bramwell, in moving a cordial vote of thanks to the author of the paper, referred to his having been present at Exeter when the subject was first introduced, and he owned then to some misgivings. "Now, however, having himself travelled on "the locomotive referred to, when he took the opportunity of "putting searching questions to the driver, whose answers were "most satisfactory, such advantages as the very low consumption "of fuel referred to in the paper, and the prevention of scale, had "convinced him that the system was a good one, which he hoped "to see generally adopted."

In the same section, Mr. Hope, V.C., made a very amusing and successful attack on the authorities who manufacture ordnance at Woolwich, under the title of "A Suggestion for Esti- "mating the Error in the Flight of Heavy Projectiles due to the "Woolwich System of Rifling." Mr. Hope said:

The association was established for the "advancement of science," and gunnery is, or, rather, should be, a branch of applied science. When, therefore, it was found that in rifling big guns the Government officials were acting not only in violation of the plainest and most obvious teaching of science, but also in defiance of common sense, the section afforded an opportunity for exposing a misapplication of public money. The theory of the rifle, whether a big gun or a small one, was that, by causing the projectile to rotate round its axis in the direction of its trajectory, a steadiness was imparted to its flight analogous to that which enabled a top to stand upon its point while spinning. But just as an unskilful schoolboy will start his top with a "wobble," or, in other words, will cause it to rotate round a line not coincident with its axis, and thus to lose its steadiness, and even to cease to spin at all, so a gun may be made in such a way as to cause its projectile to wobble in like manner, and altogether to lose the directness of its course. Incredible as it might appear, the authorities at Woolwich specially rifled their guns so as to rotate the projectile round some line divergent from its axis. The result was what we had recently seen; the guns themselves were ripped up and rendered unserviceable, and their shooting was most inaccurate. Yet, in spite of all remonstrance, the officials at Woolwich stick to their system with a tenacity worthy of a better cause. It is the practice of the anonymous and inscrutable powers there presiding, and known in the service only by the name of "They," to allow, in the case of big guns, considerable "windage"—that is to say, the shot is made smaller than the bore of the gun. "They" fondly imagine that the laws of gravity do not apply to heavy projectiles while in the bores of guns, that the shot on entering the guns become suspended midway between the top and the bottom of the bore, so as to distribute the windage equally all round the shot. He need not tell Section G that no phenomena of that nature has ever yet been observed, and that the shot in every case lies on the bottom of the bore, so that the windage is not equally distributed. This being so, it is evident that the circle representing a cross section of the bore of the gun is eccentric from the circle representing the shot, and it follows that if the gun is rifled round its own axis, it cannot make the shot rotate round its axis, but round some other line. When a Woolwich gun is fired, the rifling acts first, of course, upon the front set of studs of the projectile, and, with a violent jerk, aggravated by the acceleration in the twist of the rifling, wrenches the shot out of the former line of its own axis parallel with that of the gun, and places it to a certain extent athwart the gun—a proceeding which the shot every now and then resents by ripping up the gun with its studs. In a less unfavourable case, the shot simply starts from the gun with a "wobble" analogous to that of the badly spun top.

Mr. Merrifeld, who followed Mr. Froude, said:

The only reasonable ground which he had ever heard assigned for adopting this increasing pitch was the idea that the powder acted on the rear of the shot very suddenly, like a kick given to a door, and that consequently the shot was impeded, and the strain on the gun increased, if it had suddenly to take up a considerable amount of rotation, and that it was therefore better to make the twist very small at first. But he pointed out that there was really no such abrupt action, and that there was less excuse for the statement now than formerly, in consequence of the introduction of a slowly burning powder, which produces less shock at first, while it gives the same muzzle velocity. Alluding to Mr. Chadwick's remark that the Woolwich authorities were under the disadvantage of having inferior metal to that used by Sir Joseph Whitworth, he fully admitted this to be the case, but he considered that to be an additional reason for avoiding a system of rifling which tried the gun so unnecessarily as the Woolwich system. He called attention to the fact that while the ordinary and proper "life" of a large gun was reckoned at 1200 or 1300 rounds at least, the 12½-ton gun in the *Plucky* was not allowed to fire more than 400 shot, and had actually been changed twice for the boat to fire less than 1200 rounds, the guns first used being returned to Woolwich. He also called attention to the limit imposed by this system of rifling, both on the size of the guns and on the length of the shot; for the increase of these could not be met by a corresponding increase in the distance between the studs. Naval designers were very much hampered in their work by this restriction of the efficiency of the implement, which was really the foundation and mechanical unit of their design of ships of war. He then went on to say that the consent of all mechanicians and engineers with whom he had ever conversed was absolutely unanimous in the condemnation of the Woolwich system of rifling, and that he had never heard any serious defence of it. He would not attribute personal motives to any one, but he could not conceive of any reason why the authorities persisted in the use of the Woolwich system except sheer obstinacy and unwillingness to admit that they were in the wrong—qualities of great value in an officer entrusted with the defence of a fortress, but very bad qualities in officers charged with the superintendence of mechanical work.

Mr. FULCHER, of Woolwich, stated that the windage had since last March been much reduced; and that now, at the muzzle of the gun, it amounted to no more than the 5000th of an inch.

Mr. HOPE, in reply, expressed his great pleasure at hearing that the windage had been lately reduced. As the Woolwich authorities had once listened to reason, and had laid aside one error, he hoped that in the course of 10 or 20 years they might lay aside some other, and that so by degrees, reforms might be introduced into the service.

The height to which monomania will go was exhibited by Miss Becker, who, in discussing the sort of education that the girls of Manchester operatives should receive, protested against the time devoted to teaching needlework, and claimed it for "higher education." This is truly Midsummer madness. Admitting to the fullest extent the advantage of developing the intellect of girls, to throw impediments in the way of their learning to sew, and in the best manner, too, is like depriving the sons of agricultural labourers of an opportunity of using the spade, the fork, and the hoe, in order to devote their whole time to book-learning of any kind. The working-class girl who cannot sew and fashion her own garments, and keep in order those of her husband when she gets one, is certain to be a slattern, and probably worse. The same rule obtains in the education of middle-class girls, although not so vitally important. Imagine the tax on a father or a husband, a doctor or a lawyer, in moderate circumstances, whose four daughters in the one case, and whose wife in the other, understood nothing of, or despised such truly domestic work as mending, if not making, their and his linen. These "high falutin'" ladies are confusing means with the end. The first business of life

is to live and earn a living. Imagine the state of a purely literary household, where study was the sole occupation, and work was left to the inferior being, the man!

This is the season of railway meetings, when all the directors have to give an account of their past proceedings and future prospects. To any one but a doctrinaire, the general result as far as the public is concerned would seem to be eminently satisfactory. The great and prosperous companies, following the wise lead of the Midland, have been carrying millions of third-class passengers in the thickly populated manufacturing districts with a profit, and everywhere without loss. The plan is at present in its infancy. The final result will be to decrease the number of the second-class and increase the number of the third-class carriages. The London and North-Western, and the Great Northern, have obtained access to the Midland coal-field, and a new line of railway has been opened to Manchester. These are the statements of the paying lines, which alone the advocates for the State purchase of railways have in their eyes. But the reports of the lines that pay nothing at all, or a very insignificant dividend—the lines which a Chancellor of the Exchequer would utterly decline to touch, because their only prospects of profit lie in a large and uncertain expenditure of more capital—are not less interesting to the travelling public. An investigating committee of shareholders have found a great mess in the finances of the Metropolitan. It appears to have been rather too long under the exclusive control of an autocratic engineer and a financing director. The end is that the dividend has dropped to 1 per cent. But so far from the public being injured, this depression has stimulated the completion of the line to Liverpool Street, where it will meet the extensions forced on the unwilling shareholders of the non-dividend paying Great Eastern, by parliamentary pressure, which, beside placing Walthamstow, Enfield, Stoke Newington, and Edmonton within season-ticket distance, unite the main Ipswich, Cambridge, Norwich, and Peterborough lines with the circle of the Underground Railways. A little further east, a still more unprosperous undertaking, the East District—another underground line—has raised the needful capital, at an awful sacrifice, and is about to dive under the London Docks, as well as the Thames, and form an easy connexion between all the railways on the north-east of the Thames with those of the south-east side. The depressed Great Eastern Railway Company has also taken up the sea passage question, and, on the strength of dredgings of the river Scheldt, between Flushing and Antwerp, is about to put on the Harwich station four boats of the Holyhead stamp. Thus, within two, or, at most, three years, from any station on the inner or outer circle, the inhabitants of the metropolis may take departure for any port of the kingdom or any chief town. The *Echo*, which never misses a chance of reviling the results of private railway enterprise, went into hysterical lamentations at the unhappy condition of the shareholders of the Metropolitan, and the consequent eventual loss to the public. It must be admitted that the public is best served by a prosperous railway company, especially in the details of locomotion; but will the *Echo* be bold enough to assert that a Government railway board would ever have constructed any of the Underground railways, or the London, Chatham, and Dover, which is now carrying out the dream of a bygone generation of engineers—a general central station on Holborn Viaduct? It is not from the department of Mr. Gore, of the Woods and Forests, or Mr. Ayrton, or Mr. Galton, of the Board of Trade, or the Woolwich gentlemen who have made such a mess of the gun manufacture; it is not from such Chancellors of the Exchequer as Mr. Lowe or Mr. Ward Hunt that money would have been found for the Metropolitan Extension of the Midland or the Shoreditch continuations of the Great Eastern. Railway officials are human, are sometimes dishonest, and often foolish; but when the *Echo* turns to Government for honest and prudent management and exact service, it must have forgotten the Admiralty prosecutions, the South Kensington defalcations, and the astounding events at the Patent Office, in which Mr. Edmunds was concerned. The stock argument is to refer to the management of the Post-Office and the Telegraph Department; the fact being that people suffer generally in silence the robberies and wrongs in those departments. They suffer at the hands of the Post-Office, because, under no circumstance, does that department pay compensation. As for the Telegraph Department, it blunders neither less nor more than private establishments, but is much better protected from actions for damages. Government at the head of the railways means finality for years, interrupted by bursts of public indignation, as at the Admiralty, at Woolwich, at the Woods and Forests, and the Board of Works. Mr. Ayrton at the head of a Railway Board would almost frighten the editor of the *Spectator*, and yet he is just the man, with a reputation for administrative ability, likely to be put in such a place.

The Brighton Company are not going to let the Dover lines monopolize the Channel passage with big boats. Stimulated by competition and low dividends, the chairman promises harbour improvements at Newhaven that will admit the largest class of Irish packet boats, and make the Dieppe line the shortest and quickest route to Paris.

The new Licensing Act leaves quite enough time for those who wish to spend their week's wages on Sunday. In the meantime, Puritan ascetics insist upon closing every innocent place of indoor amusement on that day of rest. This restriction is particularly striking in Bethnal Green, where the new Museum is the only place of the kind, a museum in the highest degree creditable to every one concerned in it—to Sir Antonio Brady, who agitated and secured the land; to Mr. Cole and those who selected the educational sections; and to Sir Richard Wallace for a collection of pictures too fine to be appreciated by the masses, but yet exciting amongst them healthy curiosity and admiration.

Correspondence.

ON MR. R. H. JONES'S PLAN FOR THE COLLECTION OF GAS ACCOUNTS.

SIR,—Having for years had experience in gas accounts, perhaps I may be permitted to say a few words on the subject of Mr. Jones's plan, as introduced before the members of the Gas Managers Association, and also on F. N. G.'s remarks thereon, as appears in your JOURNAL of July 2, and to supplement this communication with a brief sketch of a scheme, having for its object the lessening of Gas companies bad debts.

First as to Mr. Jones's five period system of collecting, his experience of which he states is as an "owner and lessee," but he does not mention whether he has any experience of its working with a company, the which I consider very essential, because most companies are under statutory enactments to publish accounts made up to December 31 in each year, and now that is to be done without a very considerable amount of labour and expense, at the busiest period of the year; when, according to Mr. Jones's plan, the months of December and January are to be collected together, I do not comprehend, and therefore in the absence of explanation upon that point, it would, I think, be unfair to make further comment.

With regard to F. N. G.'s partiality for the discount system, it is not a solitary one I have known it tried by several companies and approved, but at times it produces contentions; large consumers, not from any inability to pay, but from some other cause, encroaching on the prompt day. The plan also causes more attention and labour on the part of the rental clerk, and therefore I cannot say it is universally approved of, or that I think it would answer in all cases.

With reference to F. N. G.'s desultory notes on open "ledgers" and the usual routine of "book-keeping by day book, journal, &c.," in preference to the "tabulated system," I would say, perhaps the form he used was not good, or, if good, not adapted to *his* purpose; if otherwise, I can scarcely understand that he would have relinquished it for the open ledger system, and I do not consider I stand alone in this idea; in fact, if the opinion of fifty companies were obtained on the question, I venture to believe that the majority in favour of the tabulated system would be very large indeed.

I may say, if we take a retrospect of the history of book-keeping for the last century, we shall find that its progress has been very much enhanced by the introduction of the "tabulated system" in almost all branches of commerce.

We might as well go back to ancient times, when the practice was to enter in the "waste-book," or "memorial," "I have in ready money," instead of as we do now in the cash-book, "brought forward," or "cash in hand."

And now for the suggestion I beg to tender, having for its object the lessening of bad debts.

Companies to support (say by a fixed annual subscription) a protection society, each subscribing company to forward once a quarter to the secretary of the association, a list of all consumers who may remove from the company's district without recollecting to discharge the gas account; these names, with residences, occupations, &c., to be printed in alphabetical order, and a copy sent to each subscribing company. I need scarcely say that new consumers in one locality would thus be enabled to be informed of their past liability, and reminded of the deposit clause in the Act of the company they are about to patronize.

With this brief sketch I beg to close. Should the scheme meet with approval, I shall be most happy to assist in endeavouring to carry it out.

EDWD. SANDELL, *Public Accountant*

4, *Skinner's Place, Sise Lane, Aug.* 5, 1872.

HULL WATER SUPPLY.—The Corporation Water-Works Committee met at the town-hall, on Monday, Aug. 12, Alderman Chapman in the chair. The engineer, Mr. Dale, presented his usual statement, which showed that the largest quantity of water sent into the town on any one day during the past fortnight was on the 3rd inst., 5,405,740 gallons, and the smallest on the 7th, 4,939,321 gallons. The average daily supply was 4,998,479 gallons. The town-clerk said that the Hull Water-Works Bill had come before the House of Lords, and Lord Redesdale had objected to certain clauses referring to the Hull Court of Record. His lordship did not think the subject proper for private legislation, although Salford and Manchester had got private bills. The Water-Works Bill had passed, and a public Act had been passed, embracing the clauses referring to the Courts of Record, which was available for all towns similarly circumstanced as Hull. The chairman remarked that the clauses would be of more value to the town than the whole cost of the Water-Works Bill. The chairman afterwards stated that the labourers employed in constructing the new syphon across the river had struck for an advance of from 4s. to 5s. per day. It was resolved that the work be suspended for a time.

METROPOLIS GAS COMPANIES, 1871.

REVENUE ACCOUNT, *compared with that of* 1870, *showing the Increase or Decrease in each Item.*

	Chartered.*		Commercial.		Imperial.		Independent.		London.		Phœnix.		Ratcliff.		South Metropolitan.		Surrey Consumers.		Western.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Total gas-rental	71527	..	3571	..	44492	..	2983	..	6277	..	8504	..	1818	..	7679	..	4891	..	8253	..
Common gas	70043	..	3428	..	43621	..	3699	..	6138	..	5352	..	1802	..	7375	..	5028	..	..	..
Cannel ditto	458	..	..	..	..	..	..	..	..	300	..	..	..	..	..	..	..	..	8861	..
Public lights, including lighting and contracts	1027	..	145	..	870	..	..	715	385	..	3152	..	15	..	304	..	..	186	..	607
Meter-rents	77	..	None	chrgd.	1031	..	35	..	98	..	1287	..	90	..	None	chrgd.	13	..	195	..
Old materials	710	..	45	..	850	..	78	..	66	..	..	164	..	49	..	163	6	..	..	39
Products	2479	..	..	564	150	..	251	..	..	2384	..	613	..	373	2918	..	..	21	475	..
Miscellaneous	537	..	5	..	102	..	762	..	809	..	26	..	..	8	311	..	..	16	5	..
Total income from all sources	75331	..	3056	..	46626	..	4108	..	4866	..	9040	..	1477	..	10745	..	4782	..	8889	..
Ditto expenditure on revenue account	40128	..	1969	..	46792	..	3133	..	13009	..	10938	..	2976	..	4592	..	1472	..	11210	..
Gross profit	35202	..	1087	..	..	166	975	..	..	8143	..	1898	..	1500	6154	..	3400	..	..	2321
Capital and borrowed moneys	275531	..	..	17	144400	..	10800	..	46138	..	17092	..	..	..	..	..	447	..	6216	..
Gross profit per cent. on capital, &c.	0·57	..	0·25	..	..	0·56	..	0·05	..	1·56	..	0·38	..	1·30	2·05	..	1·27	..	..	0·75
Ditto ditto on the gas-rental	1·99	..	..	0·13	..	2·53	..	0·07	..	6·17	..	2·79	..	6·49	3·68	..	2·00	..	..	3·53

METROPOLIS GAS COMPANIES, 1871.

EXPENDITURE, *compared with that of* 1870, *showing the Increase or Decrease in each Item.*

	Chartered.*		Commercial.		Imperial.		Independent.		London.		Phœnix.		Ratcliff.		South Metropolitan.		Surrey Consumers.		Western.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Coals, including carriage and dues	18271	..	3885	..	14057	..	1057	..	13843	..	6086	..	433	..	4353	..	899	..	6231	—
Purifying materials	2317	..	50	..	149	..	..	152	36	..	..	659	73	..	324	..	..	17	..	363
Supervision, labour, &c.	2491	..	743	..	3684	..	..	185	1897	..	209	..	712	..	1256	..	302	..	1992	—
Repair and maintenance of premises, tools, &c.	5205	..	..	4942	22843	..	2453	..	..	44	..	2977	788	..	..	100	1217	..	4091	—
Rents, rates, and taxes	1764	..	905	..	4369	..	258	..	..	335	2321	..	291	..	631	..	435	..	745	—
Salaries	..	1877	5	..	475	..	28	..	279	..	289	..	9	..	224	..	2	..	50	—
Collectors commission	776	..	58	..	344	..	82	..	110	..	348	..	24	..	127	..	..	10	111	—
Stationery, printing, and general charges	..	1055	30	..	347	..	101	..	192	..	828	..	2	..	..	142	..	88	..	230
Directors	..	1294	..	..	..	..	200	..	150	..	..	..	..	..	..	..	..	..	250	—
Auditors	..	112	..	..	..	..	..	..	..	..	..	..	..	..	..	..	21	..	..	—
Distribution and repair of mains and services	8664	..	3181	..	..	148	61	..	..	2608	4493	..	1	..	..	2360	..	427	..	1309
Restoring and replacing meters	1710	..	..	911	1222	..	..	138	143	..	466	..	165	..	489	..	..	547	..	199
Law and parliamentary charges	..	647	..	66	..	424	..	25	125	..	..	49	..	4	..	4	..	455	..	112
Bad debts and extraordinary expenses	3915	..	..	969	..	28	..	196	..	778	..	414	..	682	..	206	136	..	..	47

* Amalgamated with the City of London, Great Central, and Equitable Companies.

DETAILS OF INCOME, FOR THE YEAR 1871.

ABSTRACT OF DETAILS OF INCOME AND EXPENDITURE, SHOWING THE PROFIT REALIZED.

* Amalgamated with the City of London, Great Central, and Equitable Companies.

DETAILS OF INCOME, FOR THE YEAR 1871.

ABSTRACT OF DETAILS OF INCOME AND EXPENDITURE, SHOWING THE PROFIT REALIZED.

Name of Company.	Total Gas-Rental.	Common Gas.	Price per 1000 Cubic Feet.	Cannel Gas, at 5s. 3d., 5s. 5d., and 5s. per 1000 Cubic Feet.	Public Lights, including Lighting and Contracts.	Meter-Rents.	Old Materials.	Products.	Miscellaneous.	Total Income from all Sources.	Total Expenditure on Revenue Account.	Gross Profit.	Capital and Borrowed Moneys.	Gross Profit per Cent. on the Capital and Borrowed Moneys.	Gross Profit per Cent. on the Gas-Rental.
	£ s. d.	£ s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Chartered	632,356 19 3	500,533 4 5	3 9	83,730 8 5	48,093 6 5	5,773 9 3	2471 10 5	115,693 9 10	2,978 1 2	759,273 9 11	546,756 13 6	212,516 16 5	2,892,408 0 0	7·34	33·60
Commercial	142,968 12 2	127,497 5 1	4/0 & 3/9	..	15,471 7 1	None chgd.	573 1 4	27,331 6 7	193 12 7	171,066 12 8	119,954 7 3	51,112 5 5	437,247 15 0	11·69	35·75
Imperial	610,808 11 7	540,617 15 2	3 9	..	70,190 16 5	13,980 4 10	2084 7 8	116,136 19 1	1,467 6 3	744,477 9 5	549,682 0 3	194,795 9 2	2,334,235 0 0	8·34	31·89
Independent	79,875 13 10	74,093 7 9	3/4 & 3/2	..	5,782 6 1	2,488 10 10	428 8 7	22,567 1 1	1,078 2 4	106,437 16 8	81,778 0 5	24,659 16 3	244,000 0 0	10·10	30·87
London	176,441 0 4	146,250 18 8	3 9	10,493 5 11	19,696 15 9	3,653 0 9	848 18 9	38,809 13 2	3,073 18 2	222,826 11 2	156,740 16 0	66,085 15 2	810,302 0 0	8·15	37·45
Phœnix	208,051 13 2	181,821 1 1	3/9 & 4/2	..	26,230 12 1	4,758 9 7	228 6 0	43,781 13 9	3,207 2 10	260,027 5 4	170,706 14 4	89,320 11 0	960,388 0 0	9·29	42·92
Ratcliff	34,285 3 8	30,338 17 11	4 0	..	3,946 5 9	113 13 9	190 0 3	7,309 15 2	144 7 3	42,043 0 1	30,551 13 3	11,491 6 10	115,670 0 0	9·93	33·52
South Metropolitan	98,663 4 8	85,502 12 11	3/2 & 3/-	..	13,160 11 9	None chgd.	174 16 6	27,495 12 11	1,811 3 2	128,144 17 3	92,127 11 9	36,017 5 6	300,000 0 0	12·00	36·50
Surrey Consumers	71,192 13 7	58,392 1 8	4 0	..	12,800 11 11	17 3 0	65 5 0	15,266 14 1	206 13 3	86,748 8 11	56,642 3 4	30,106 5 7	264,707 0 0	11·37	42·28
Western	150,664 11 11	..	5 0	134,918 0 6	15,746 11 5	3,598 16 4	40 0 0	12,879 8 4	21 2 6	167,203 19 1	117,689 11 3	49,514 7 10	414,500 0 0	11·94	32·86
	2,205,308 4 2	1,745,047 4 8	..	229,141 14 10	231,119 4 8	34,383 8 4	7104 14 6	427,271 14 0	14,181 9 6	2,688,249 10 6	1,922,629 11 4	765,619 19 2	8,773,457 15 0	8·72 Average.	34·71 Average.

DETAILS OF EXPENDITURE ON REVENUE ACCOUNT, FOR THE YEAR 1871.

Name of Company.	Coals, including Carriage and Dues.	Purifying Materials.	Supervision and Labour in Manufacture of Gas.	Ordinary Repair and Maintenance of Premises, Tools, and other Implements.	Rents, Rates, and Taxes.	Salaries.	Collectors Commission.	Stationery, Printing, and General Charges.	Directors.	Auditors.	Expense of Distribution and Ordinary Repair of Mains and Services.	Restoring and Replacing Meters.	Law and Parliamentary Charges.	Bad Debts and Extraordinary Expenses.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Chartered	320,671 12 9	6,675 7 5	75,587 12 11	39,223 1 11	20,221 18 4	4,251 19 8	7,359 9 10	3,785 16 11	5,771 9 6	280 13 0	37,211 6 9	11,845 8 2	1,155 18 7	12,714 17 9
Commercial	67,132 10 5	1,922 7 2	15,358 2 4	11,233 2 0	4,165 16 11	1,523 0 0	1,410 18 0	1,411 3 1	1,500 0 0	150 0 0	11,494 19 5	1,136 17 2	..	1,515 10 0
Imperial	295,418 17 6	6,805 19 5	52,470 3 0	98,921 19 7	19,191 15 3	8,889 7 6	8,818 15 8	5,836 9 2	4,000 0 0	157 10 0	30,886 7 9	9,518 18 10	858 14 0	8,412 2 7
Independent	45,619 5 2	616 9 3	11,635 8 11	8,032 8 0	3,131 9 3	1,192 14 0	1,466 13 10	887 2 9	1,700 0 0	100 0 0	5,172 19 5	1,339 2 6	..	884 7 4
London	86,862 12 7	1,226 10 7	21,223 10 11	15,564 0 6	7,721 9 2	1,479 9 6	2,699 9 3	1,215 8 2	1,800 0 0	100 0 0	11,993 15 1	3,254 2 7	306 11 10	1,293 15 10
Phœnix	88,082 0 7	1,513 16 1	20,212 2 6	21,181 3 5	8,689 10 1	1,922 10 0	3,200 8 5	1,328 3 11	2,000 0 0	100 0 0	16,100 10 7	3,994 0 6	..	2,382 8 3
Ratcliff	13,705 11 3	300 12 11	4,741 14 7	3,578 16 0	1,275 4 0	660 17 6	346 3 0	269 16 3	800 0 0	31 10 0	3,064 11 4	667 7 5	..	1,099 9 0
South Metropolitan	48,637 15 0	1,358 16 11	14,693 2 0	5,344 8 11	3,824 0 9	1,471 5 0	1,379 15 11	1,180 12 0	1,200 0 0	100 0 0	9,152 5 3	2,066 9 2	74 0 9	1,645 0 1
Surrey Consumers	33,066 5 9	702 4 7	7,166 2 10	3,715 3 5	3,119 3 6	996 2 0	634 7 11	658 14 6	1,350 0 0	84 0 0	3,698 3 0	617 19 7	85 7 5	748 8 10
Western	74,118 13 6	2,862 19 6	14,443 12 0	7,169 1 2	3,116 6 6	1,905 0 0	1,590 9 1	1,025 2 8	1,750 0 0	120 0 0	7,621 15 5	824 17 6	6 9 4	1,135 4 7
	1,073,315 4 6	23,935 3 10	237,531 12 0	213,963 4 11	74,456 13 9	24,292 5 2	28,906 11 8	17,598 9 5	21,871 9 6	1,223 13 0	136,396 14 0	35,275 3 5	1,982 1 11	31,831 4 3

TABLE *showing the Income, Expenditure, Profit, and Capitals of the Metropolitan Gas Companies per Ton of Coal carbonized in the Year* 1871.

Name of Company.	INCOME PER TON OF COAL CARBONIZED.					EXPENDITURE PER TON OF COAL CARBONIZED.															Gross Profit per Ton of Coal carbonized.	Capital and Borrowed Moneys per Ton of Coal carbonized.
	Total Gas-Rental.	Meter-Rents.	Old Materials.	Products.	Miscellaneous	Total Income from all Sources.	Coals, including Carriage and Dues.	Purifying Materials.	Supervision and Labour in the Manufacture of Gas.	Ordinary Repair and maintenance of Premises, Tools, and other Implements.	Rates, and Taxes.	Salaries.	Collectors Commission.	Stationery, Printing, and General Charges.	Directors.	Auditors.	Expense of Distribution and Ordinary Repairs of Mains and Services.	Restoring and Replacing Meters.	Law and Parliamentary Charges.	Bad Debts, and Extraordinary Expenses.	Total Expenditure on Revenue Account.	
	£ s. d.	d.	d.	s. d.	d.	£ s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	d.	d.	d.	d.	d.	s. d.	d.	d.	d.	£ s. d.	s. d.	£ s. d.
CHARTERED . . . (partly cannel gas.)	1 11 10·19	8·48	1·49	5 9·92	1·79	1 18 2·90	16 1·81	0 4·03	3 9·68	1 11·70	1 0·22	2 57	4·44	2·28	3·48	0·16	1 10·49	7·15	0·69	7·68	1 7 6·45	10 8·44	7 5 8
COMMERCIAL . . .	1 13 0·03	None charged.	1·58	6 3·71	0·53	1 19 5·86	15 5·96	0 5·32	3 6·54	2 7·11	0 11·53	4·21	3·90	3·90	4·15	0·41	2 7·84	3·14	..	4·19	1 7 8·28	11 9·58	5 0 11
IMPERIAL. . . .	1 12 3·77	8·87	1·32	6 1·73	0·93	1 19 4·63	15 7·54	0 4·32	2 9·51	5 2·80	1 0·18	5·64	5·59	3·70	2·53	0·10	1 7·60	6·04	0·22	5·84	1 9 0·96	10 3·66	6 3 5
INDEPENDENT . . .	1 9 4·98	10·99	1·89	8 3·74	4·78	1 19 2·36	16 9·59	0 2·74	4 3·41	2 11·47	1 1·83	5·27	6·48	3·92	7·71	0·44	1 10·86	5·91	..	3·90	1 10 1·39	9 0·97	4 9 10
LONDON . . . (partly cannel gas.)	1 14 0·50	8·45	1·96	7 5·85	7·11	2 2 11·90	16 9·10	0 2·83	4 1·13	3 0·03	1 5·87	3·42	6·25	2·81	4·16	0·23	2 3·76	7·53	0·71	2·99	1 10 2·89	12 9·00	7 16 4
PHŒNIX	1 13 7·49	9·22	0·44	7 0·90	6·21	2 2 0·29	14 2·62	0 2·93	3 3·19	3 5·07	1 4·85	3·72	6·20	2·52	3·87	0·19	2 7·22	7·74	..	4·62	1 7 7·06	14 5·22	7 15 2
RATCLIFF	1 16 1·87	1·43	2·40	7 8·50	1·82	2 4 4·05	14 5·44	0 3·80	5 0·00	3 9·28	1 4·13	8·36	4·38	3·41	9·11	0·39	3 2·77	8·57	..	1 1·91	1 12 2·62	12 1·42	6 1 11
SOUTH METROPOLITAN	1 8 8·27	None charged.	0·61	7 11·94	6·32	1 17 3·14	14 1·71	0 4·74	4 3·26	1 6·64	1 1·34	5·13	4·81	4·12	4·18	0·34	2 7·93	7·21	0·25	5·74	1 6 9·46	16 5·67	4 7 2
SURREY CONSUMERS	1 11 6·13	0·09	0·34	6 9·08	1·09	1 18 4·75	14 7·62	0 3·73	3 2·06	1 7·73	1 4·56	5·29	3·86	3·49	7·17	0·44	1 7·64	3·28	0·45	3·97	1 5 0·84	13 3·95	5 17 1
WESTERN . . . (cannel gas.)	2 5 0·65	1 0·91	0·14	3 10·21	0·07	2 10 0·00	22 1·97	0 10·27	4 3·83	2 1·72	0 11·18	6·83	5·70	3·67	6·27	0·43	2 3·35	2·96	0·02	4·07	1 15 2·32	14 9·68	6 3 11
AVERAGE . .	1 12 10·30	6·14	1·27	6 4·39	2·53	2 0 0·65	15 11·90	0 4·28	3 6·47	2 2·25	1 1·81	4·34	5·16	3·14	3·91	0·22	2 0·38	6·30	0·35	5·69	1 8 7·56	11 4·14	6 10 8

Circular to Gas Companies.

OUR usual abstract of the accounts of the metropolitan gas companies for 1871 will be found in other columns. They show an enormous increase in the consumption of gas, and, on the whole, advancing prosperity in the companies. The increase in total gas-rental in 1871, as compared with the previous year, is £159,995; and the increase in the quantity of gas consumed cannot be less than 1000 million cubic feet. The quantity of gas sold by meter in 1871 was 10,336,573,450 cubic feet, and an estimate of the amount supplied to public lights and sold under contract added, gives a total consumption of nearly 12,000 millions. This increase is pretty evenly divided between all the companies, there having been an advance in every instance. There was also an increase in the total gas-rental of every company, notwithstanding reductions of price in the cases of the Commercial, Independent, South Metropolitan, and Phœnix. This last-named company again keeps the lead in making the highest profit on gas rental; but the correspondent, "Keep the Lead," who addressed us on this subject last year, would have had no difficulty in showing that the South Metropolitan, the price of gas being considered, has really made the highest profit. The order in which the companies stand as regards profits on rental is as follows:—

Phœnix. . . .	42·92	per cent.; price	3s. 9d. and 4s.
Surrey Consumers.	42·28	,, ,,	4s.
London . . .	37·45	,, ,,	3s. 9d. and 5s.
South Metropolitan	36·50	,, ,,	3s. 2d. and 3s.
Commercial . .	35·75	,, ,,	3s. 9d. and 4s.
Chartered . . .	33·60	,, ,,	3s. 9d., 5s. 3d. & 5s. 5d.
Ratcliff . . .	33·52	,, ,,	4s.
Western . . .	32·86	,, ,,	5s.
Imperial . . .	31·89	,, ,,	3s. 9d.
Independent . .	30·87	,, ,,	3s. 2d. and 3s. 4d.

A comparison of this table with last year's show that the per centage profits are on the whole considerably reduced. In that year five companies made over 40 per cent. The changed position of the Chartered will be remarked. Last year it stood at the bottom of the list, making only 29·38 per cent., but the advantages of the Beckton works are now becoming visible in the financial results. There has been an increase in the cost of purifying materials in the case of the Chartered Company, which is not remarkable when the increased production of gas is considered. The small increase, under the same head, in the accounts of the Imperial Company, looks more remarkable, when it is seen that the increase in the production of gas is nearly as much in the case of the Chartered. The market for products seems to have not been quite so good as in the previous year.

The table of income, expenditure, and profit per ton of coal carbonized, which we give again this year, will be looked at with much interest. In this the improvement in the case of the Chartered Company is made very apparent by the increased profit of 1s. per ton on coal carbonized. The effect of a reduction of price is clearly shown in the cases of the Independent and Imperial Companies. On the other hand, the South Metropolitan shows an increased profit on the ton of coal, in spite of a reduction of 2d. during a part of the year. The cost of labour and supervision in manufacture stands in these accounts very nearly as in the last, but a noteworthy reduction under this head has been made in the case of the Chartered. On the average, the cost of coal was lower in 1871 than in 1870. A great change will no doubt be seen in the accounts for the current year, particularly in the cost of coal; but the prevailing opinion now appears to be that the present high prices will not long be maintained. It is not to be expected, however, that the cost of labour will go back. If illustrations were wanting of the economy of large undertakings, and the expensiveness of small, they would be found supplied in the cases of the Chartered and the Ratcliff Companies, in the latter of which the cost of labour and supervision, salaries, and directors allowances are greatly in excess of the former.

The Board of Trade expenses—that is, the salaries and expenses of the metropolitan gas referees, the chief gas examiner, and the official auditor—amount in all to £4413 10s. 10d., which is equivalent to a tax of about 1 per cent. on the gross profits of the three companies who share the cost.

The above are what appears to us the most striking features of the returns now published, which exhibit the gas industry of the metropolis in a great and deserved state of prosperity.

The affairs of the Patent Gas Company are shrouded in mystery. For some reason or other, no report of the late meeting has appeared even in the journal from which, in general, all that can be known about the company is gathered. All we hear is that a dividend of 20 per cent. and a bonus of 2½ per cent. were declared. Notwithstanding this the shares have gone rapidly down, and now stand at nearly the lowest figure they have reached since the speculation

in them began. The suppression of any report of the proceedings at the meeting would be an unwise act, not at all calculated to create confidence in the company, but likely to lend strength to the rumours abroad, and the absence, we presume, must be owing to the non-attendance of reporters. We have still to wait for the report of Dr. Odling and Mr. Keates. The experiments at the works, we are told, are completed, but now a number of laboratory experiments are needed. We cannot see the necessity for these. The commercial value of the patent process can be decided at East Barnet or nowhere, and if we could by any possibility arrive at a knowledge of the results and expenses there, the gas world would be in a position to arrive at some conclusion. We read that the directors of the South Metropolitan Company have been satisfied by their small experiments, and are now about to give the system a trial on a working scale.

The amalgamation of the Western with the Chartered Company will not be effected without some opposition on the part of shareholders in the former. At the meeting of the Chartered Company the scheme for the amalgamation was adopted *nem. con.:* but at the Western meeting it met with a formidable opponent in the person of Mr. Michael, who moved that the scheme be not proceeded with unless the Chartered Company are prepared to grant a 10 per cent. preferential dividend, as in the cases of the Great Central and Equitable Companies. His argument will be found in another column, and deserves serious consideration. It will be remembered that when the amalgamation was first spoken of we remarked that if the union were effected the western district would probably cease to have an exclusive supply of cannel gas; and it would appear from the speech of the chairman at the Western meeting that one chief reason for promoting the amalgamation is the desirability or the necessity of substituting wholly or in part the supply of common for cannel gas. On this point, no doubt, the directors are perfectly right. Whatever fluctuations there may be in the price of common gas coals, it may be taken for certain that the cost of cannel will go on advancing, and the time would surely come when the Western Company must make the change of supply or considerably advance the price of their gas. Mr. Michael's amendment was carried by the show of hands, but the proxies confided to the chairman reversed the decision at the ballot. The opponents to the amalgamation threaten some further opposition, but it is not clear yet what shape it will take.

We are blamed in a Ryde journal for advising the inhabitants of that town to try and make the best of what they consider a bad bargain. It is really in our opinion the only course open to them. The Corporation decided on going to arbitration, and must abide by the result. Their error was in rushing into the transaction without being well advised as to the probable cost. All would have been well if the estimate of their valuer had been adopted by the arbitrators; but there are two sides to every question, and the umpire did not accept the Corporation valuation. The advice comes rather late now, but the wisest course the Corporation could have pursued would have been to leave the company with their works, and trusted to the Gas-Works Clauses Act for the protection of the consumers, which, if enforced, would speedily have brought down the price of gas to 4s. 6d., whereas there is now little chance of its being less than 5s. for years to come.

Advances in the price of gas continue to be made all over the country, and at present we do not see how they can be avoided. There are well-informed people who believe that the present extraordinary price of coal will not long be maintained, but the prospect of an early reduction is not clear, and gas companies ought not to be expected to make sacrifices or incur risks which no other commercial undertaking would be required to make or incur. At Horsham and Keymer Ditchling the price has been raised 10d.; at Newbury and Faversham, 6d.; and at Kendal, 5d. At Huntingdon and Godmanchester the price has been advanced 1s. 3d. to ordinary consumers, and 10d. to large consumers and for public lights. In Droitwich an advance has been made for public lights. At Londonderry 10d. additional is charged. In Scotland some advances have been made: at Johnstone 20 per cent., and Milngavie 25 per cent. At Kirkintilloch, 5d. has been added, and at Wishaw the price has been raised to 5s. 10d. per 1000. On the other hand, at Dumbarton the price for public lights has been reduced 3d.

South Metropolitan Gaslight and Coke Company.—An extraordinary general meeting of the proprietors of this company was held yesterday afternoon, to consider and determine respecting the next call and future calls on the new shares. T. B. Simpson, Esq., occupied the chair, and a report from the directors was read, which stated that the gasholder and other works now approaching completion would nearly absorb the balance of capital in hand, and that, in order to provide for the erection of a new retort-house, an addition of £20,000 to the paid-up capital was required. Resolutions were passed authorising a call of £1 per share on the new shares, payable on the 1st of October, and empowering the directors to make further calls as and when they find it necessary.

Parliamentary Intelligence.

MUNICIPAL CORPORATIONS (BOROUGH FUNDS) ACT.

An Act to authorize the application of Funds of Municipal Corporations and other Governing Bodies in certain cases.

20 & 21 *Vict.*, *c.* 50.

Whereas by the Act passed in the session holden in the twentieth and twenty-first years of the reign of Her Majesty, intituled "An Act to amend the Acts concerning the Municipal Corporations," the trustees acting under any Act of Parliament for supplying any borough, or any district within or in certain cases beyond the limits of a borough, with water or gas, or having powers for providing or maintaining any cemetery or market in or for any borough, or otherwise improving the same, are authorized and empowered to transfer to the body corporate of such borough all their rights, estates, properties, and liabilities:

And whereas by the ninty-second section of the Act passed in the session holden in the fifth and sixth years of the reign of King William the Fourth, chapter seventy-six, to provide for the regulation of municipal corporations in England and Wales, in each borough the annual proceeds of all property and hereditaments belonging to the body corporate, and fines and rates levied in the borough, are directed to form the borough fund, and such fund is directed to be applied in the payment of certain salaries and certain expenses, and the expenses necessarily incurred in carrying into effect the provisions of the said Act, and the surplus (if any) of such fund is directed to be applied, under the direction of the council, for the public benefit of the inhabitants and the improvement of the borough:

And whereas the Public Health Act, 1848, the Local Government Act, 1858, and various local Acts of Parliament, have conferred powers of improving, cleansing, paving, lighting, and otherwise governing places or districts upon boards of health, commissioners, trustees, or other persons:

And whereas it is expedient to extend the powers of governing bodies so as to enable them to apply the borough or other funds under the control of such governing body towards such costs, charges, and expenses as may be incurred for the purposes and in the manner herein provided:

Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons in this present Parliament assembled, and by the authority of the same as follows:—

Interpretation of Terms.

1. The term "governing body" in this Act shall mean the council of any municipal borough, the board of health, local board, commissioners, trustees, or other body acting under any general or local Act of Parliament for the management, improvement, cleansing, paving, lighting, and otherwise governing places or districts, and the term "district" shall mean the borough, place, township, or district within which the governing body may for the time being have jurisdiction: Provided, however, that in the borough of Cambridge, in any matters affecting the constitution, power, or functions of the Board of Cambridge Improvement Commissioners, as defined in the several Acts of Parliament relating thereto, the term "governing body" shall mean such Board of Improvement commissioners, and not the council of the borough of Cambridge.

Costs of Promoting or Opposing Parliamentary and other Proceedings for Benefit of Inhabitants to be charge on Borough and local Funds except in certain cases.

2. When, in the judgment of a governing body in any district, it is expedient for such governing body to promote or oppose any local and personal bill or bills in Parliament, or to prosecute or defend any legal proceedings necessary for the promotion or protection of the interests of the inhabitants of the district, it shall be lawful for such governing body to apply the borough fund, borough rate, or other the public funds or rates under the control of such governing body to the payment of the costs and expenses attending the same; and when there are several funds or rates under the control of the governing body, such governing body shall determine out of which fund or funds, rate or rates, such expense shall be payable, and in what proportions: Provided that nothing in this Act contained shall authorize any governing body to promote any bill in Parliament for the establishment of any gas or water works to compete with any existing gas or water company established under any Act of Parliament: Provided that no powers contained in this clause shall apply in any case where the promotion of or opposition to a bill by a governing body has been decided by a committee of either House of Parliament to be unreasonable or vexatious.

No Payment to Member of Governing Body to be so charged.

3. No payment to any member of a governing body for acting as counsel or agent in promoting or opposing any such bill shall be charged as aforesaid.

Costs of Promoting or Opposing Bills to require Sanction of Special Meetings.

4. No expense in relation to promoting or opposing any bill or bills in Parliament shall be charged as aforesaid unless incurred in pursuance of a resolution of an absolute majority of the whole number of the governing body at a meeting of the governing body, after ten clear days notice by public advertisement of such meeting and of the purpose thereof in some local newspaper published or circulating in the district, such notice to be in addition to the ordinary notices required for summoning such meeting, nor unless such resolution shall have been published twice in some newspaper or newspapers circulating in the district, and shall have received, in respect of matters, within the jurisdiction of the Local Government Board, the approval of such board, and in respect of other matters, the approval of one of Her Majesty's Secretaries of State, and in case of the promotion of a bill in Parliament no further expense shall be incurred or charged as aforesaid after the deposit of the bill, unless the propriety of such promotion shall be confirmed by such absolute majority at a further special meeting to be held in pursuance of a similar notice not less than fourteen days after the deposit of the bill in Parliament: Provided further, that no expense in promoting or opposing any bill in Parliament shall be charged as aforesaid unless such promotion or opposition shall have had the consent of the owners and ratepayers of that district, to be expressed by resolution in the manner provided in the Local Government Act (1858) for the adoption of that Act.

Proviso as to Approval of Local Government Board, &c., to any such Resolution.

5. The approval of the Local Government Board or one of Her Majesty's Principal Secretaries of State, as the case may be, shall not be given to any such resolution as aforesaid until the expiration of seven days after the second publication thereof, as provided by this Act, and in the meantime any ratepayer within the district of the governing body may give notice in writing to the Local Government Board or Secretary of State objecting to such approval.

Costs to be Examined.

6. All costs, charges, and expenses incurred under the provisions of this Act shall, before the same become chargeable, be examined and allowed by some person to be authorized by one of Her Majesty's Principal Secretaries of State or by the Local Government Board, as the case may be.

Power to direct Local Inquiry.

7. The Local Government Board, or one of Her Majesty's Principal Secretaries of State, shall have power to direct a local inquiry to be held upon any application under this Act, by any person or persons whom they may respectively nominate for the purpose, and to charge the costs and expenses of such local inquiry upon the governing body or the person by whom such application shall be made.

Saving Clause.

8. Nothing in this Act shall extend or be construed to alter or affect any special provision which is or shall be contained in any other Act for the payment of the costs, charges, and expenses intended to be provided for by this Act, or to take away or diminish any rights or powers now possessed or enjoyed by any governing body, or which are or shall be vested in or exercisable by the inhabitants of any district under any general or special Act.

Towns Improvement Clauses Act, 1847, *s.* 142 *repealed.*

9. The one hundred and forty-second section of "The Towns Improvement Clauses Act, 1847," is hereby repealed so far as the same is inconsistent with the provisions of this Act.

Act not to extend to Bills if object attainable by Provisional Order.

10. The provisions of this Act shall not extend to applications for any bill in Parliament for any object which would, for the time being, be attainable by Provisional Order.

Act not to apply to the Metropolis.

11. This Act shall not extend or apply to Ireland or the City of London or the metropolitan area as defined by the Metropolitan Local Management Act, 1855.

Miscellaneous News.

THE GASLIGHT AND COKE COMPANY.

An Extraordinary General Meeting of the Shareholders of this Company was held on Monday, the 23rd inst., at the works, Horseferry Road, for the purpose of considering the scheme for the amalgamation of the Western Gaslight Company, Limited, with The Gaslight and Coke Company. The chair was taken by the DEPUTY-GOVERNOR (the Hon. Richard Howe Brown).

The SECRETARY (Mr. Phillips) read the heads of the scheme for amalgamation, which he said was as nearly as possible word for word the same as three previous schemes which had received the approval of the shareholders.

The DEPUTY-GOVERNOR: Gentlemen, I believe it has been my privilege to preside here over every meeting connected with the amalgamations with other companies; therefore, my personal views as to the policy of amalgamation must be pretty well known among you. I am an amalgamator on principle. We have found with regard to the amalgamations which we have already made, that they have tended very materially to benefit the parent company, and the result of them has been most satisfactory to the companies with which we have amalgamated. We have now to propose to you another amalgamation, which is with the Western Company; and in asking you for your support and approval of this scheme, I may just state that although we have found the amalgamations with companies to which we have guaranteed a fixed dividend most beneficial to the parent company, we now propose, in consequence of our strengthened and improved position, to amalgamate with the Western Company with no guarantee whatever. We propose to amalgamate with the Western Company, a company which for twelve years has paid its maximum dividend of 10 per cent.—a company which has a district second to none in London at present unemployed or unlighted, and a company which, free of all debts, brings to our coffers a very considerable dowry in the sum of £30,000. I believe, gentlemen, that the district of the Western Company is almost inexhaustible. It has got a district to the west of London totally uncovered at present, but which is being covered by houses every day in the week. Its rental is enormously increasing, and we believe, when that district is regularly covered as other districts in the metropolis, it will render us a very largely increased income. Of course we cannot exceed our parliamentary dividend, but I think the surplus we shall get from the profits not only of this Western Company, but of the other amalgamated companies, will enable the old Chartered Company to secure for the whole of its shareholders, of whatever class, their maximum dividend for all time—at least, we hope so, unless circumstances arise over which we can have no control, such as the extraordinary rise in the price of iron and coal. I shall make no more remarks, but shall beg to move as a matter of form—"That the amalgamation of the Western Gaslight Company, Limited, with this company be approved, and that the scheme of amalgamation as now read be affirmed and adopted, subject to such alterations at the suggestion of the Board of Trade as the directors may agree to."

Sir THOMAS DAKIN: I beg to second the motion, and cordially concur in the remarks of the deputy-governor. Union in this case is strength, and I believe the philosophical reasoning of Mr. Cardwell, who first originated this series of amalgamations, was perfectly correct in theory, and, as we learn, it is now carried out and vouched by experience. I think it is likewise the fitness of things that the old original gas company should continue, in the language of the deputy-governor, to be a parent, and gather successive children under its wing. I believe it will not only contribute to the prosperity of all the companies, but will also materially advantage the public at large, and I have, therefore, very great pleasure in seconding the resolution.

Mr. BADCOCK said he regretted very much that a copy of the scheme of amalgamation had not been supplied to every shareholder. He received a very vague notice stating that an amalgamation was proposed between that company and the Western Company. Making some inquiries as to where the locality of the "Western" really was, all he could ascertain was that it was somewhere up west. The chairman gave a good reason against the amalgamation when he said that the company was situated in some locality at present not very extensively built over. Whether it was prudent that the parent company should take in another weakly child or not he did not know, but at any rate they ought to have an opportunity of judging for themselves. He concluded by proposing as an amendment that the meeting should be adjourned for three months in order that he might examine the scheme and ascertain whether it was judicious to proceed with it.

Mr. JACKSON said he had no intention to second the amendment, but still he sympathized with the previous speaker in the complaint that the details of this amalgamation were not forwarded to the shareholders. It would have removed the necessity of a great many of them attending if they had known that there was to be no guarantee.

The DEPUTY-GOVERNOR said he was really surprised that any man living in London should not know where the Western Company's Gas-Works were. The works, some of the largest in London, were at Kensal Green, and its district was one of the largest populated districts in London, still having an unoccupied space more than equal to any other gas company in London, on which houses were springing up every day in the week. The board was asked to distribute copies of the scheme. There were 4000 proprietors in the company, and such a practice as that which was suggested was not followed in any company with which he was acquainted. The practice was to give a single notice. If they wished to have the scheme read *in extenso*, it could be done with the greatest of pleasure; there was nothing which the board wished to conceal. The accounts of both companies had been thoroughly investigated by the best accountants in London, and gave perfect satisfaction to all parties. The rental of the Western Company was very large as compared with the capital, and it was a rental that had been increasing, and was increasing at the present moment. They had a large surplus over their 10 per cent. dividend, and that surplus would go to increase the dividend of the whole amalgamated company. The rental of the Western was £157,000 annually for gas only; and, as compared with other companies, as to the rental per ton of coal, it certainly out-topped what the Chartered Company had been formerly able to do, from its facility for getting its coal both by railway and canal, its works being admirably situated for that purpose. But now that this company had Beckton to fall back upon, we are better situated than any other company, for we shall save 5s. a ton on every ton of coal carbonized at Beckton.

Mr. BADCOCK persisted in moving the adjournment, although he found no seconder. He repeated the statements previously made, and having done so,

Mr. YOOL said he hoped they would not do anything so unwise as to adjourn the meeting. This scheme had been long in agitation; in fact, it was one of those schemes so evidently advantageous to both parties that it could be but a question of time when it should be brought formally before them. The capital of the Western was £600,000. That sum would not be a charge upon this company in any shape or way; it would not be guaranteed capital, but ordinary share capital to partake with the ordinary—a capital in the profit or loss which might from time to time be made. Up to the present time, and for ten years past, this ordinary capital of the Western, or so much of it as had been from time to time paid up, earned the maximum dividend of 10 per cent. Every gentleman who knew the district which the Western Company had yet to fill up would feel satisfied that the district must be filled up with a class of houses in which a large quantity of gas would be taken into regular consumption, and any outlay that might be necessary for laying down pipes and mains in the district would return an ample profit—in fact much more than sufficient to pay the 10 per cent. The advantage to both companies would be that in union there was strength. The advantage to the public too would be very great because there would be a considerable reduction in the expenditure of the amalgamated company as compared with that which would be necessarily incurred if the two companies remained separate; and no doubt after a short time they would be able to reduce the price of gas to the public. Upon every ground, both as to their individual interests and as to public interests, they would be acting very unwisely if they did not unanimously approve the resolution which had been submitted to them. As regarded information, the scheme had been in the office; he himself called at the office, and read it, and found everything plain and straightforward. It would perhaps have been desirable to have appended a note to the circular stating that the scheme of amalgamation was at the office and open to the inspection of any shareholder, and he hoped that that plan would be adopted on any future occasion. Having heard all that had been said *pro* and *con.*, he could not see the slightest ground for adjourning the decision.

The SECRETARY said that in the Board of Trade notices in the *Gazette* it was stated that copies of the scheme might be obtained at the Board of Trade, at the company's parliamentary agents, and at the offices of both companies. So far as the district of the Western Company was concerned, it consisted, roughly speaking, of Brompton, Kensington, Notting Hill, Kilburn, and a portion of Paddington. It extended north so far as Hampstead; it also possessed a large portion of the parish of St. James's, Westminster, right in the very heart of the Chartered Company's district, bringing in a rental of £10,000 a year.

In reply to questions, the DEPUTY-GOVERNOR stated that the agreement could be carried out without any application to Parliament, and it was in pursuance of powers already conferred.

The motion for the adoption of the agreement was then put, and carried with one dissentient.

The SECRETARY stated that a further object of the meeting was to adopt an agreement between the Great Eastern Railway Company and the Chartered Company with reference to the line of railway authorized by the company's Act of 1871. It had already been before the proprietors, and it now awaited their formal consent. It was for a railway running from the north-eastern branch of the Woolwich railway to the company's works at Beckton. The railway had been constructed, and only awaited the inspection of the officer of the Board of Trade.

The DEPUTY-GOVERNOR moved that the agreement be approved and confirmed. The strongest thing he could say in its favour was that the whole question had been gone into by their admirable colleague and late engineer, Mr. Evans, and that the whole of the details had his full approbation.

Sir THOMAS DAKIN seconded the motion, which was agreed to.

A vote of thanks to the chairman concluded the business of the meeting.

IMPERIAL GASLIGHT AND COKE COMPANY.

The Half-Yearly General Meeting of the Proprietors of this Company was held at No. 33, John Street, Bedford Row, on Thursday, Aug. 22—E. VAUGHAN RICHARDS, Esq., Q.C. (the governor), presiding.

The SECRETARY (Mr. Harry Chubb) having read the advertisement convening the meeting, the seal was affixed to the register of proprietors.

The following report and statement of accounts, having been previously printed and circulated, were taken as read:—

The accounts of the company for the half year ending the 30th of June last, which are herewith submitted to the shareholders, show an available balance of £110,477 8s. 8d. This sum will admit of the payment of dividends at the maximum rates of 10 per cent. per annum on the company's capital stock, and of 7 per cent. per annum on the £12 10s. shares, and leave a surplus of £12,003 4s. 5d.

Your directors recommend that dividends at the maximum rates be declared accordingly.

Of the above surplus of £12,003 4s. 5d., a portion must be applied in making good the amount drawn from the reserve-fund last year, and the remainder will be carried forward to the credit of the present half year.

The company will require during the current year an increased quantity of coal to meet the extending demand for gas, and, in common with all the metropolitan gas companies, your directors find themselves compelled to pay a very much higher price for that material than they paid during the past year. They feel satisfied that they are within the mark in estimating this enhanced cost at not less than £75,000. The price of all other articles used in the manufacture of gas, as well as in the construction and repair of gas-works, together with the rate of wages, has also very greatly increased of late, and must of necessity tell severely on the head of "expenditure" in the next account, though it is but slightly apparent in the half year now under review. In contemplation of these heavy demands, your directors have found themselves compelled to restore, as from the 1st of July last, the one penny per 1000 cubic feet by which they reduced the price of gas in July, 1871, before the present unexpected and unprecedented advance in the prices for materials took place.

The promptness with which the company made the reduction in the price of gas last year, when surrounding circumstances seemed to justify it, will, your directors hope, be accepted as a proof of the eagerness with which they will watch the opportunity of again reducing the scale of charge for gas, in the event of the present advance in prices for material proving to be of a temporary character.

The existing state of things would occasion your directors great apprehension, if they were not supported by the expectation that an advance in the price of coke and of other gas residuals will largely compensate the company for the increased expenditure which is forced upon them.

Your directors have spared no efforts to ensure the completion of so much of the company's new works at Bromley as will be sufficient to supply the additional quantity of gas required in the company's district during the ensuing winter, and they believe that they shall be able to commence the manufacture of gas at those works in November next.

The expenditure of capital necessarily incurred for the new works, and in laying down the large 48-inch mains, destined to convey the gas from those works to the district of supply, has absorbed the amount realized by the issue of 26,000 £12 10s. shares in May, 1870; and, further outlay being required, your directors propose that 26,000 additional £12 10s. shares, carrying, as before, a maximum dividend of 7 per cent., be created under the powers of the company's Act of 1869. For this purpose a special resolution will be submitted to the shareholders at the present meeting.

The new shares, if authorized, will be offered in the first instance, as heretofore, to those who are shareholders in the company at the time of issue. It may be useful to the shareholders to be informed that the issue of the new shares will probably take place in November next, and will be made in the proportion of one new £12 10s. share for every £85 of capital held by each shareholder, whether in stock or shares, or as nearly in that proportion as circumstances may permit.

IMPERIAL GASLIGHT AND COKE COMPANY.

Statements of Account for the Half Year ending June 30, 1872.

No. 1.—STATEMENT OF STOCK AND SHARE CAPITAL, *on June 30, 1872.*

Acts of Parliament authorizing the Raising of Capital.	Description of Capital.	Maximum Dividend authorized.	No. of Shares issued.	Nominal Amount of Share.	Called up per Share.	Total paid up.	Amount issued but not paid.	Remaining to be issued and called up.	Total Amount authorized.
17 Vict., cap. 55.	Stock.	10 per cent.	..	..	..	£1,560,000 0	..	..	£1,560,000
29 & 30 Vict., cap. 352.	Share.	7 Ditto.	26,000	£12 10 0	£12 10 0	325,000 0	..	..	325,000
32 & 33 Vict., cap. 128.	Ditto.	7 Ditto.	26,000	12 10 0	10 0 0	259,977 10	£22 10	£715,000	975,000
						£2,144,977 10	£22 10	£715,000	£2,860,000

No. 2.—STATEMENT OF LOAN CAPITAL, *on June 30, 1872.*

Acts of Parliament authorizing the Loan Capital.	Description of Loan.	Rate per Cent. of Interest.	Total Amount borrowed, June 30, 1872.	Remaining to be borrowed.	Total Amount authorized.
17 Vict., cap. 55.	Bonds for profits capitalized.	10 per cent.	£130,000	..	£130,000
	Debentures	4 to 5 ditto.	42,500	500	43,000
29 & 30 Vict., cap. 352.	Ditto	Ditto.	81,250	..	81,250
32 & 33 Vict., cap. 128.	....	..	40,400	203,350	243,750
			£294,150	£203,850	£498,000

No. 3.—CAPITAL ACCOUNT.

To Expenditure, to Dec. 31, 1871			£2,194,113 16 6		Certified Receipts to Dec. 31, 1871.	Received since that date.	Total Receipts to June 30, 1872.
Since that date—							
Land	£479 1 7			By Consolidated Stock (1871) . .	£1,560,000 0 0	..	£1,560,000 0 0
New buildings and machinery in extension of works	117,215 13 0			Ditto £12 10s. Shares (1866) . .	325,000 0 0	..	325,000 0 0
New and additional mains and services	29,624 2 10			Ditto £12 10s. ditto (1870) . .	194,985 0 0	64,992 10 0	259,977 10 0
		147,318 17 5			£2,079,985 0 0	£64,992 10 0	£2,144,977 10 0
Total expenditure.		£2,341,432 13 11		Bonds for capitalized profit . .	130,000 0 0	..	130,000 0 0
Balance		97,694 16 1		Debentures	124,250 0 0	39,900 0 0	164,150 0 0
		£2,439,127 10 0			£2,334,235 0 0	£104,892 10 0	£2,439,127 10 0

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—		
Coals, including dues, carriage, unloading, &c.	£155,033 13 8			Per meter (1,506,808,000 cubic feet)	£274,747 2 10	
Purifying materials, oil, and sundries . . .	2,748 0 10			Public lighting and under contracts	34,127 14 1	
Salaries of engineers and officers at works . .	2,116 10 0					£308,874 16 11
Wages (manufactory)	25,258 15 9			Meter-rental		7,337 9 10
Repairs and maintenance of works and plant, machinery, apparatus and tools, materials and labour—less £752 9s. 7d. received for old materials	29,708 6 5			Residual products—		
		£214,865 6 8		Coke, less charges, and £2507 4s. 9d. loss on breeze	49,972 10 5	
Distribution—				Tar	5,972 4 3	
Salaries and wages of officers connected with distribution	4,790 11 0			Ammoniacal liquor	6,687 18 1	
Repairs, maintenance, and renewals of mains and services, including materials, paving, and labour	2,373 13 3					62,632 12 9
Meters—repairs and renewals	5,329 19 1			Rents receivable		652 7 8
		12,494 3 4		Transfer fees		39 7 6
Public lamps—						
Lighting and repairing		6,910 2 4				
Rents, rates, and taxes—						
Rents payable	1,225 14 6					
Rates and taxes	6,333 15 9					
		7,559 10 3				
Management—						
Directors allowance	£2,000 0 0					
Company's auditors	78 15 0					
Salaries of secretary, accountant, and clerks .	4,632 10 0					
Collectors commission	4,536 1 9					
Stationery and printing	1,481 0 4					
General charges and incidentals	916 5 11					
		13,644 13 0				
Law charges		130 15 0				
Bad debts		2,538 8 7				
Gas referees and official auditor	£1,222 6 0					
Public testing-offices.	6 18 1					
		1,230 4 1				
Total expenditure		259,373 3 3				
Balance, carried to profit and loss account (No. 5)		120,163 11 5				
		£379,536 14 8				£379,536 14 8

No. 5.—PROFIT AND LOSS ACCOUNT (NET REVENUE).

To Interest on bonds and debentures, to June 30, 1872	£10,131 1 1		By Balance from last account	£89,472 3 7
Ditto on temporary loans	351 0 6		Amount drawn from reserved fund	5,590 19 3
Balance	110,477 8 8			£95,063 2 10
			Less dividend for the half year ending Dec. 31, 1871	95,063 2 10
			Amount from Revenue Account (No. 4)	£120,163 11 5
			Interest on calls in arrear	0 10 4
			Dividend on contingency-fund, invested in Consols.	795 8 6
	£120,959 10 3			£120,959 10 3

No. 6.—RESERVED FUND.

To Profit and loss account to make up deficiency for dividend in previous year	£5,590 19 3	By Balance from last account	£81,250 0 0
Balance	76,899 13 1	Dividends on Consols	1,240 12 4
	£82,490 12 4		£82,490 12 4

No. 7.—CONTINGENCY-FUND.

To Balance	£50,000 0 0	By Balance from last account	£50,000 0 9

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, Jan. 1, 1872.	Received during Half Year.	Carbonized or used during Half Year.	In Store, June 30, 1872.
	Tons.	Tons.	Tons.	Tons.
Newcastle	22,083	183,435	180,422	25,096
Cannel	2,172	15,179	10,860	6,491
	24,255	198,614	191,282	31,587

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, Jan. 1, 1872. Estimated.	Made during Half Year. Estimated.	Used in Manufacture during Half Year. Estimated.	Sold during Half Year.	In Store, June 30, 1872. Estimated.
Coke—chaldrons of 36 bushels	7,728	191,283	52,156	141,954	4,901
Breeze—ditto	1,455	23,274	..	24,416	313
Tar—Gallons	358,168	1,751,782	235,872	1,766,738	107,340
Ammoniacal liquor—butts of 108 gallons.	1,742	26,437	..	26,407	1,772

No. 10.—BALANCE-SHEET.

To Capital, for balance per account (No. 3)	£97,694	16	1	By Amount invested in Three per Cent. Consols—		
Treasurer for amount received on call made on July 1, 1872	27,175	0	0	Reserved fund	£75,659	0 9
Reserved fund, for amount of account (No. 6)	76,899	13	1	Contingency-fund	50,000	0 0
Contingency-fund, ditto (No. 7)	50,000	0	0	Cash at bankers	76,016	2 5
Interest due to June 30, 1872, on bonds and debentures	10,130	4	8	Gas and meter rental, for amount due to company, to June 30, 1872	133,218	16 9
Sundry tradesmen and others, for amount due for coals, stores, &c., to June 30, 1872	29,275	2	0	Coke and other residuals, ditto	8,863	16 6
Profit and loss, for balance of account (No. 5)	110,477	8	8	Sundry accounts, ditto	5,398	11 4
				Coals, for stock on hand	28,539	8 3
				Coke, ditto	2,807	6 6
				Tar and ammoniacal liquor, ditto	801	7 1
				Sundry stores, ditto	20,347	14 11
	£401,652	4	6		£401,652	4 6

We have examined the above accounts, and certify them to be correct. { W. Hawes, Robert S. Mansel. } *Auditors.*

I hereby certify that the above accounts are correct, and that there are no losses or forfeitures to be deducted.
Chas. H. Parkes, *Official Auditor.*

The Governor: Gentlemen, the report which you have just now taken as read contains, we flatter ourselves, a concise, but tolerably complete account of our immediate past, present, and future. With regard to the past, I think we may congratulate ourselves upon the state of our accounts for the half year ending the 30th of June last. You will perceive by them that we are in a position, after paying the maximum dividend allowed by law upon the several classes of stock in the company, to recoup the sum which we took from the reserve-fund at the last occasion, so that the reserve-fund is absolutely full, and to carry over a small but respectable balance—nearly £7000—to the credit of the current half year. I think this must be considered a very satisfactory state of things. With regard to our present, and immediate future, no one whom I have the honour to address to-day can be ignorant of the tremendous and absolutely unprecedented rise which has taken place in all kinds of materials, and perhaps in none more than in that which so largely concerns gas companies—coal. The report tells you, and I believe it rather understates the matter than otherwise, that the enhanced cost of coal will be not less than from £70,000 to £75,000 during the current year beyond the amount we should have paid had the same quantity been purchased last year. That, of course, becomes a very serious matter—a matter of considerable anxiety, but in my opinion a matter of no apprehension. You, however, are just as capable of judging as I am, having the same data to go upon; but I cannot help thinking you may view the fact, not perhaps without some anxiety, and it may be well to state what means we have of meeting this extraordinary state of things. First, there is the balance of £7000—almost too small a sum, you may consider, to mention in this connexion. Then I think we have taken a step which you will regard as a prudent one, that of restoring the 1d. per 1000 cubic feet, by which we reduced the price of gas in July, 1871. That will give us an additional £12,000 this year, so that we have £19,000 towards this enhanced cost. And further we reasonably expect, and up to the present time our expectations have been realized, that the price we shall get for our residuals, and notably for coke, which, of course, is the principal item among our residuals, will serve to a considerable extent as a compensation for the increased price of coal. At the same time it is no use concealing from ourselves the fact that if we are disappointed in this respect, the cost of coal will become a very serious matter. Under these circumstances, while we look to the future with carefulness and anxiety—and I beg you to understand that I do not venture to prophesy in any way—I, for one, and I believe those around me entertain the same opinion, do not see any ground for apprehension. That very sagacious old gentleman, John Bull, seems also to entertain very much the same opinion that we do, for he goes into the market at the present time and pays very handsomely in the shape of premium for the sake of obtaining gas property, and never before, under any circumstances, were gas shares more smiled upon in the Stock Exchange than at the present time. Let us, therefore, dismiss the future with the expression of a well-grounded hope that things will still continue to prosper with gas companies. When the cost of coal diminishes, we shall be able to diminish the price of gas; but it is obviously as impossible to sell cheap gas with coal dear, as to sell cheap bread with corn dear, or to sell cheap meat while cattle command a high price in the market. Well, then, gentlemen, there are two or three things I am about to mention, in order that you may not imagine that we, your directors, are asleep. It is true we do not take quite so active a part, and our names do not appear quite so prominently as some others in connexion with new enterprises—patent gas companies, or steam stoker companies, or things of that sort—but I assure you we are not blind to these matters. We have most carefully investigated the merits of the Patent Gas Company, but we have not, up to the present time, adopted the scheme they suggest. I pass it over with this remark, because it is no business of mine to say one word for or against the invention; but, depend upon it, we have never slept over it. Then, with regard to the steam stoker, in the present day, when there are so many strikes, it is impossible to view any scheme by which we can be relieved of the consequences of such a course with indifference. If the steam stoker is brought to anything like perfection, depend upon it the Imperial Gas Company will not be slow to adopt it; for, though I think the Steam Stoker Company somewhat premature in their statements—I dare say you have all received five or six of their circulars; I think I myself received about eight—still there perhaps lies in their system the germ of a possible useful invention hereafter, and at all events we are not blind to any advantages it may offer us. Another matter I may refer to as a thing of interest to all commercial companies, and that is the question of strikes and wages. I am happy to say that our workmen some short time ago presented to us a requisition in terms which I have no hesitation in stating did them infinite credit. We met them with a rise in their wages, and since then they have gone on in a most satisfactory manner, which I trust will continue. I believe they will be, and I hope they are tolerably free from the influence of those professional agitators who live in idleness themselves, battening on the wages of their fellow-workmen. Our principle is to pay our men well, and we expect by so doing to get good servants about us. We have always paid them well, and, up to the present time, they have given us good service in return. We are not bad masters, and we certainly have good men. There is another question which has made some slight stir lately in the gas world, and that is the sulphur question. I believe that as much nonsense has been talked about that as it is possible to conceive. We live in an age when clap-trap and humbug are a good deal cultivated, and I do not think the sulphur question can be otherwise regarded. I have the authority of Dr. Versman—a name well known in the scientific world—that in an ordinary apartment, such as perhaps most of those present would occupy, lighted with three fishtail burners (which would not consume 100 cubic feet of gas in a winter's evening), assuming the gas to be infinitely worse than any gas now supplied in London, and that such gas contains 40 grains of sulphur per 100 cubic feet—which is in excess of the truth—yet, owing to the diffusion of the gas, and the ventilation of the room, there will never be, according to Dr. Versman, as much sulphur at any one time in the room as would be given out by snapping three lucifer matches. I do not pretend to be a chemist, but if any gentleman present desires to follow up the inquiry, he will find very much information respecting it in an elaborate lecture delivered before the British Association of Gas Managers, by Dr. Odling, on the 8th of June last. The lecturer distinctly treats the sulphur question as to a great extent a bugbear. I dare say you are all aware that by the Metropolis Gas Act of 1860 we were limited to 20 grains of this impurity in every 100 cubic feet of gas. When the gas question was before Parliament in 1868 and 1869, much was said about this deleterious compound; some people seemed to be afraid that they should be fed upon it before their time. The consequence was that the court of referees was established, by whom it was to be decided what amount of purity should be exacted from the gas companies; and the actual number of grains of sulphur per 100 cubic feet was left an open question to be thereafter determined by those gentlemen. You know it is much easier to enact a thing of that kind by Act of Parliament than it is to arrive at a practical conclusion as to the proper amount. The referees accordingly found the question was a much more complex question than they were prepared to deal with, and they naturally hesitated about laying down a limit without due inquiry. This delay caused that very enterprising body the Metropolitan Board of Works to write to another and equally enterprising body, the Board of Trade, on the subject. "What is this?" they said. "By the Act of 1860 the sulphur limit was fixed at 20 grains, and we certainly expected that by the Act of 1868 we should be much better off in this respect. How is it the referees have done nothing in the matter?" Whereupon the Board of Trade wrote to the referees to ask all about it, and the referees wrote back to say that they have gone into a variety of questions, but they find it most difficult and complex to deal with. The correspondence has been published by Parliament, from which it appears that the referees state that they have not slept over the subject, that they have instituted many investigations, and they enclose a list of the experiments made. I will undertake to say that that list of experiments, conducted with great ability, affords the best possible reason why they hesitated to come to any distinct decision as the number of grains of sulphur which ought to be allowed. But then, as the Board of Trade would have something done, the referees at length say, "We will fix 30 grains as the maximum." The referees were in a peculiar position. The Board of Trade pressed to have something done in the matter; indeed, it seemed as if the very appointment of the referees themselves depended upon their yielding to the pressure, notwithstanding their position as arbitrators between the companies and the consumers. The Board of Trade, however, appear still to have been dissatisfied, for, shortly afterwards, they seemed to think the referees were of no particular use, and they are now under notice to quit, so that on the 1st October they will cease to exist. The referees have since, on further investigation of the matter, come to the conclusion that 30 grains of sulphur per 100 cubic feet is not a legitimate limit for those companies which are not in a position to use lime in the process of purification. I dare say you are aware that to reduce the amount of this impurity below 30 grains is simple enough if you can use lime, but in certain places in the metropolis this cannot be done without creating a nuisance, and this fact is distinctly recognized in the Act of Parliament, which says that the referees, in determining the amount of sulphur to be allowed,

shall take into consideration the circumstances of each gas factory. In consequence of this the referees have said that where lime cannot be used—and it cannot be in our works, the limit of 30 grains shall not apply, and the matter at the present time is therefore left open. What the Board of Trade are going to do we do not know, but from a letter they have sent to us we understand they propose that there shall no longer be a permanent court of referees, but that they will call in two or three scientific gentlemen for the nonce, and I suppose they know whether in doing so they are proceeding in conformity with the Act of Parliament. At present, as I say, we have no limit; we, however, on our part, endeavour, although it is a very costly operation, to reduce the number of grains to the lowest possible amount under the circumstances I mentioned—viz., that we cannot use lime without creating a nuisance. I believe the whole thing to be a piece of humbug, and another proof of the claptrap of the age, and that a great deal more is said about it than it is really worth. I merely mention the matter to you because it is one of those things that has made a little stir in the gas world, and I wish you thoroughly to understand that we are not blind to these questions, or deaf to what is going on. I assure you, on the contrary, that we thoroughly investigate them all Well, gentlemen, the only other matter which specially remains to be dealt with is the raising of new capital. We propose to raise—indeed, it was contemplated when the Act of 1869 was passed—the sum of £975,000, in three lots of £325,000 each. We have raised one lot of £325,000, and the time is now come when we require further capital. We have laid out a great deal of money at Bromley upon our new works, and this has absorbed the amount realized by the first issue. We therefore propose to issue 26,000 additional £12 10s. shares very shortly—the report says probably in November next; but I believe if we could have the money before it would be a great convenience. The works at Bromley are progressing very rapidly. They are being built with a view to the future, for good economy points out the absurdity of constructing them on a scale only adequate to our present demands. The mains are on the largest scale, the gasholders also, and the retort-house and dock are also planned with a regard to the extended demands of the future. Our money has been spent in this way, and any shareholder who wishes to go into the exact figures may know them, but to recite a number of items before a body of gentlemen who have not the means of taking them down does not convey very much information. I may broadly state that something like £400,000 has been expended on works and land and mains, and there remains about £121,000 now due upon contracts actually entered into. In addition to to this, there are other things absolutely necessary, such as putting a roof to the retort-house, and one or two matters of that sort, which will represent another £60,000. Then, again, as the demand for gas goes on, there will be a call for a fresh retort-house and additional gasholders, but I suppose if we continue to pay you the maximum dividend allowed by law, you will not consider it any great hardship that we should ask you for more capital. I think now I have said all that occurs to me to say on this occasion, and I conclude by proposing formally—"That the report and accounts be received, approved, and entered on the minutes." I shall be happy to answer the inquiry of any proprietor who may desire further information, and trust I shall be able to satisfy him and the meeting generally.

Sir ANTONIO BRADY: I have listened with great pleasure to the remarks of our governor, to whom, I think, we owe a debt of gratitude for the very lucid explanation of our affairs with which he has favoured us, and I have great satisfaction in seconding the motion for the adoption of the report.

The motion was at once put, and carried unanimously.

The GOVERNOR moved the declaration of dividends at the maximum rates of 10 per cent. per annum on the capital stock of the company, and of £7 10s per cent. per annum on the £12 10s. shares, payable on the 31st inst.

Mr. BARCLAY FARQUHARSON WATSON (deputy-governor) seconded the motion, which was put, and carried unanimously.

The GOVERNOR next moved a formal resolution authorizing the issue of a further portion of the additional share capital which the company have power to raise under the Imperial Gas Act, 1869, to the extent of £325,000, in shares of £12 10s. each, with a maximum dividend of 7 per cent.

Mr. WATSON seconded the motion.

The GOVERNOR: Gentlemen, we have always endeavoured on these occasions to tell you precisely what occurs to us, and, though you must understand me as not absolutely saying the board have decided this, I think it right to state that we want some of the money as rapidly as possible. We propose, therefore, to issue these shares as soon as we can do so. The report says, probably in November. Then comes the question of the deposit upon them. I believe the strong impression on our minds is that it would be very desirable to ask for £5 deposit on allotment, and that will be followed at no distant period by a call of £2 10s. per share. We want, in fact, £200,000. A £5 deposit will give us £130,000, a call of £2 10s. will give us £65,000, making a total of £195,000, and I do not think we can do with less than £7 10s. per share by the middle of February next. You must understand me not to pledge the board to this, because we have only just taken the matter into consideration, but this is what occurs to my own mind as the probable state of things. I trust that the £5 on allotment will be found not otherwise than convenient to the shareholders.

A PROPRIETOR: Will you allow the allottees to pay up the whole at once?

The GOVERNOR: At what rate of interest?

The PROPRIETOR: Seven per cent.

The GOVERNOR: No, certainly not. We do not think in these days we can undertake to pay 7 per cent. for money which we do not want; and bear in mind, too, another thing—John Public stands outside, and would soon begin to complain if we raised money we did not want at 7 per cent.

The PROPRIETOR: Paying up at once gets rid of all the trouble of paying calls.

The GOVERNOR: I respect the man who has that feeling, and I may add that I envy him too. Without pledging the board to anything, I will only say your suggestion as to paying up at once shall receive every possible attention.

A PROPRIETOR: After the allotment is made, will you allow us to pay up in full, say at 5 per cent., until the calls are due?

The GOVERNOR: I will undertake to say that the proposition shall receive every consideration by the board, but you cannot expect me offhand to say anything that will pledge the directors. The rate of interest at present is low, and, though I have sanguine hopes as to the future, it is impossible not to see that the enhanced price of coal, and possibly a fall in the value of coke, makes this a period when it is not desirable to enter into obligations without grave consideration.

A PROPRIETOR: Suppose the cost of coal is unconscionably raised, have we the power to raise the price of gas?

The GOVERNOR: The answer to that inquiry is, that there is a provision in the Act of Parliament. I am thankful to say that we should not have to go to the Legislature on the subject, there being machinery in the existing Act, by which the Board of Trade, in certain contingencies, can appoint arbitrators to inquire into the matter, and, within certain limits, authorize an advance in the price of gas. I believe they might fix it as high as 5s. 6d., but, I confess, I hope we may be enabled to avoid the necessity for such an arbitration. It is extremely desirable, if we can, notwithstanding the high price of coal, to maintain, and not to raise, the present price of gas, for we are quite certain of this, that the low price of gas enhances its consumption.

A PROPRIETOR: I am very pleased to hear that the directors have, in consequence, not of a strike, but of a memorial, arranged the wages of their workmen; and I am delighted also to hear the testimony of the governor that we are fortunate in having good workmen in our employ. But I should like to say what I know to be the fact, that clerks, with comparatively small fixed incomes, suffer more severely than workmen from the present high prices of provisions, coals, &c., and that these clerks are a silent suffering class, who do not combine together, as the workmen do, to worry and vex their employers by strikes for increased wages. I hope, therefore, that the directors do not overlook the class I refer to with respect to their rate of pay at the present critical time.

The GOVERNOR; I have no hesitation in saying that if any necessity arose—I am far from saying it has not; on the other hand, I am inclined to say it has—the sort of terms which exist between the board and their servants is such that if the latter would come into this room and say what they have to say in support of any application, we should discuss the matter with them in a proper spirit, and if any claim was made out, we are not the sort of persons to treat them otherwise than kindly and considerately. Every word that I have said with reference to our workmen I would repeat with tenfold force in respect of our clerks. We believe that we pay them liberally, and I am bound to say that no company have a better set of officers than the Imperial Gas Company. I speak in the presence of two or three of the superior officers of the company, and I say that if they thought it necessary they would have no hesitation in coming to us and stating their case; and I am sure that we should give them as kindly a hearing as it is possible to do.

The motion having been put and carried,

A cordial vote of thanks was given to the directors for their admirable management of the affairs of the company.

The GOVERNOR acknowledged the vote, and the proceedings terminated.

WESTERN GASLIGHT COMPANY, LIMITED.

An Extraordinary General Meeting of the Shareholders of this Company was held at the Offices, Argyll Street, Regent Street, on Friday, Aug. 23, to take into consideration the scheme for the amalgamation of this company with The Gaslight and Coke Company, and also a resolution to be submitted by the board for increasing the borrowing powers of the company from £50,000 to £200,000. LIGHTLY SIMPSON, Esq., presided.

The SECRETARY (Mr. Barber) read the notice convening the meeting, and the following special report of the directors, having been printed and circulated previous to the meeting, was taken as read:—

The directors, after mature consideration, and subject to a mutually satisfactory examination of the accounts of the two companies, to the approval of the shareholders and of the Board of Trade, have agreed upon a scheme for the amalgamation of the Western Gaslight Company with The Gaslight and Coke Company, as advertised in the public papers.

Under the conditions of the amalgamation, the ordinary paid-up shares of the two companies will be placed upon equal terms in all respects, and with regard to the D shares of the Western Gaslight Company, it has been arranged that a call shall be made payable before the 1st of October next, and the remaining instalments by December, 1875, and probably at an earlier date.

The Western gas shareholders are also to divide rateably with the shareholders of The Gaslight and Coke Company the million of new capital which the latter have, by an Act of this session, been authorized by Parliament to issue, with the right to dividends up to 10 per cent.

The statutory right of the ordinary shares of The Gaslight and Coke Company, with regard to a £10 per cent. dividend, will attach to all the shares of the Western Company.

The Western Company's reserved fund will become part of the divisible profits in hand of the united company.

For the benefit of the united company it is proposed to increase the borrowing powers of the Western Company from £50,000 to £200,000, being one-third of the share capital.

A form of proxy is enclosed, with instructions as to its execution and return to the office, in the event of shareholders being unable to attend the meeting, and the directors feel confident that with the detailed explanations which will be furnished at the meeting, and which cannot be conveniently comprised within the limits of an ordinary circular, the shareholders will give their support to the proposed amalgamation as being conducive to their best interests.

It need hardly be added that the greatly increased price of cannel coal has formed a material element in the consideration of the question now submitted to the shareholders.

The CHAIRMAN: Gentlemen, the first resolution I must propose to you is—"That the scheme submitted by the directors for amalgamating the Western Gaslight Company, Limited, with The Gaslight and Coke Company be and the same is hereby approved, subject to such modifications by the Board of Trade as the directors may consider it in the interest of the shareholders to accede to."

A PROPRIETOR: Is The Gaslight and Coke Company limited or unlimited?

The CHAIRMAN: They are limited by their Act of Parliament. They are not, as we are, a "limited" company.

The PROPRIETOR: Then they are unlimited.

The CHAIRMAN: They are limited as to the amount of their shares.

The SECRETARY: Practically speaking, they are more limited than we are.

The PROPRIETOR: They are only limited as to the amount of their shares.

The CHAIRMAN: But in this company you are liable for a year after you have transferred your shares, whereas in that the shareholders are free at once the transfer is registered. Their limitation is fixed by Act of Parliament as to the amount of capital they can raise. I do not know any other limitation they can have.

The PROPRIETOR: Would it not be well to read the clause in their Act which limits them?

Mr. MICHAEL: There is no such clause.

The CHAIRMAN: Gentlemen, we have sent you on this occasion a statement of the accounts showing the result of our working for the past half year. We did so at the earliest possible moment, that you might be in a position to judge of the important step we are about to take. You are aware, of course, that the question of the amalgamation of the various gas companies of London has frequently been discussed, and to some extent amalgamations have taken place. But latterly the matter has been pressed upon us more particularly by the enormous increase which has taken place in the price of coal—an increase unexampled, I suppose, in the history of the coal trade. Not only has coal advanced—cannel coal, I mean—from 22s. to 36s. 6d. per ton, but there is a difficulty in obtaining the quantity we have contracted for delivered, even by the largest and best firms. The necessity has also been pressed upon us that at some short period hence it will be advisable for your permanent interest that we should convert this company into a company for the manufacture of gas from common coal, and this has been more especially pressed upon us by the fact that we draw our supply of cannel from a very limited area, and if we could suppose it possible that a turn-out of the colliers in that particular district took place, we should have to fall back upon the very imperfect supply afforded by Scotland and the Welsh mines, and we could not, as is generally supposed, immediately commence the manufacture of common gas, because it would require some months time, and a large outlay of capital for that purpose. This is one element which has moved us to consider carefully whether, by allying ourselves with The Gaslight and Coke Company, giving them our unoccupied territory, which we regard as of great value, and accepting the strong support they can give us in great difficulties, we should not be benefiting both companies. We have arrived at the conclusion, after careful consideration of the matter, that we should do so. They are, as you are aware, the largest company in London, possessing several stations, and all the difficulties of conversion they could bear much better than we could as a company only manufacturing cannel gas. We accordingly proceeded to examine the secretary and the engineer of the Chartered Company, and they have expressed to us their perfect confidence that their 10 per cent. dividend is as cer-

tain as, humanly speaking, anything can be. We have employed the most eminent firm of accountants we know—Messrs. Turquand, Young, and Co.—to investigate the Chartered Gas Company's accounts up to December of last year, and to report if the dividend then paid was well and truly earned. These gentlemen have carried their examination into the affairs of the past half year—I mean the one ending in June, which is not yet made up, because, as you are aware, the Chartered Company hold their meeting much later than we do—and so far as it is possible to judge, they find that 10 per cent. will be paid for that period as on the former occasion. That company have the power to raise 100,000 new shares of £10 each, entitled to 10 per cent., which is a great privilege, inasmuch as in later Acts of Parliament the dividends on new capital have been usually limited to 7 and 7½ per cent. When they come to issue this new capital, which they intend to do as soon as they require it, the shareholders in the Western Company, being amalgamated, will be entitled to take their share in the distribution, which will amount to 23,529 shares; and if issued like those in February last, it will be equal to a bonus, on a similar market value, to £61,700 on allotment, or more than £1 upon each of the 60,000 shares in the Western Company, and when paid up it will amount to £153,000, or a bonus of 50s. on each of the 60,000 Western shares. That is one of the advantages we shall obtain by the amalgamation which we now propose. You are aware, of course, that we propose to call up our D stock much quicker, in the event of an amalgamation, than we should do if we remained a separate and independent company. Perhaps I ought also to explain to you that our reserve-fund of £30,000 will become the property of the united company in the form of an unappropriated balance of cash, and not as a reserve-fund at all. The Chartered Company have no reserve-fund, but they have something of the like kind—an insurance-fund—but that is only applicable in the case of accidents; say, for example, if a gasholder were destroyed, the insurance-fund would be applicable for the purpose of restoration, and it would not necessitate, as was required in our own case when we had such a misfortune, that the cost should be taken out of revenue. So far as it goes, the insurance-fund is applicable to purposes of that kind. There is a variety of opinion as to whether the price of coal will go down; probably it may do so to some extent, but I am afraid it will not resume the price it was for some years past. For the moment, at all events, we have the great practical fact before us that it has attained an enormous advance. I represent in another company one of the largest coal buyers in London, and our attention has been seriously called to this fact. We cannot tell what the price will be, although in the course of things we think it will recede, for there is no reason why it should have advanced, but that it will fall back to the price at which it formerly stood we fear is not at all likely. One of the advantages of uniting ourselves with the Chartered Company is this, that in some parts of our district they can more conveniently furnish a supply of gas than we can ourselves. This is a small matter, but one that must be noticed. We have pressed very strongly upon that company to give us a preferential dividend such as they give to the shareholders in the Equitable and Great Central companies. We failed to secure that advantage, there is no doubt, and I mention it that you may know it has had our most careful attention. As trustees of your property we have had to form a most careful estimate of the position of the company under all circumstances, not only such as at present exist, but such as may hereafter arise. This is a matter of opinion to a great extent, but we are very desirous indeed that you should be satisfied we have arrived at a correct conclusion. A large proportion of the proprietors have confided to us their proxies, assenting to the view we take, but I should be very glad if before the proceedings of to-day are concluded, we should succeed in convincing you that we have done the best thing under the circumstances. We have conferred with several very large shareholders and others representing the interests of localities, and perhaps we have gone a little further in our explanations with them than it would be prudent to do in a meeting like this, because it is obvious that until this amalgamation is completed there is a possibility it may go off, and we do not know where what I state to-day may be quoted against us, and in what form it may be used. Never was there a more striking illustration of the old proverb that "speech is silver, but silence is golden," than is furnished on the present occasion. I feel that I am obliged to be reticent in your interests because, if this amalgamation does not take effect, I may find myself quoted hereafter to great disadvantage at half a dozen tribunals before which I may go. Therefore I must ask for the fullest confidence which the shareholders can give to the directors. We have made every inquiry respecting the company with which we are about to be associated, and we have not heard anything which, in any way, prejudices the view we have taken that it is wise on our part to come into connexion with them. Some of our shareholders have been pleased to express the most perfect confidence in the board of directors, and in the present position of our company, and have said they would prefer remaining in that position and taking all the risks of the future. Well, we are much obliged to them for their confidence, and if we were called upon to conduct your affairs in the future we should do so in the same manner that we have hitherto done—viz., to the best of our ability. You are aware, probably, that the board of this company, particularly some members of it, are the largest shareholders in the company, and, of course, their own interest as well as their duty would prompt them to weigh with the greatest possible impartiality the whole circumstances of the case. We have done so, and the resolution we have come to is contained in the paper I read to you just now, and which, if you please, I will now put. This will give an opportunity for discussion, and will elicit the opinion of the shareholders present.

Mr. EDWARDS, a director, seconded the motion.

The CHAIRMAN read the heads of the scheme of an amalgamation, and, at the request of a shareholder, read *in extenso* clauses 17 and 18, relating to the amount of capital and appropriation of the shares in the united company.

Mr. MICHAEL: I am very sorry to appear here to-day in opposition to the scheme propounded by the chairman on behalf of the board of directors, and before I say a word upon the subject, I think it due to them to acknowledge the great courtesy with which I was treated when laying before the board itself the strong objections I feel to the scheme now submitted to this meeting. The amendment which I intend to propose I may as well read at once—it is this—"That the scheme now propounded by the board of directors be no further proceeded with unless and until the Chartered Gas Company are prepared to grant a preferential dividend of 10 per cent. upon the shares of the Western Gas Company." Now, sir, I quite acknowledge—and I speak from some experience with reference to coal and gas—that at the present time there is very considerable difficulty in so managing a gas company as to ensure to the shareholders that measure of prosperity which they have hitherto enjoyed. At the same time I express my strong conviction that the circumstances under which we are now placed are entirely exceptional, that they cannot last, and moreover, that there are peculiarities in the constitution of this company which take away any fear whatever as to the continuation of the benefits we have enjoyed in the past. I do not enlarge upon this point, because there is another advantage which overrules it. I acknowledge that this company, so far as the metropolis is concerned, is exceptional; that it has to contend not only with the ordinary difficulty attending the price of coal, material, and wages—affecting very considerably its prosperity—but it also has an additional difficulty from the very limited area from which its supply of coal is derived. But it must be remembered that we are not on that account to rush into arrangements which our judgments, when we have time to reflect on the circumstances, will not justify. We must recollect, too, that many companies, especially in the northern parts of the country, are under precisely similar circumstances, and I confess I fail to see that any serious results can arise from our present position. But if it comes to the worst we have two protections. The first is that we are very far below the maximum price we might charge for our gas; and acting, as we certainly must do, in the interests of our shareholders and the public, and looking upon ourselves to some extent, after we have received our maximum dividend, as trustees of the public, to furnish gas at the lowest possible price, yet there is nothing to prevent, if circumstances demand it, such a rise in price as will effectually meet any difficulty experienced from the exceptional state of the coal market. But then, again, supposing we are obliged to resort to that which I consider should be the last expedient, though I am not prepared to say it would not be policy under exceptional circumstances, in reference to the price of cannel—we are in a position at once to assimilate this company with that of other companies in the metropolis, and supply common gas at ordinary prices. I am quite sure, looking at the district we have to supply, that we need fear no competition, and that in taking such a step as that we should be able still to realize our 10 per cent. And I come at once to this point as one of great importance—that you never would have heard of the Chartered Company being prepared to absorb this company within itself unless there were a certain profit accruing thereby to the Chartered Company. Now, it is that one point upon which I insist. I quite go with the chairman, and I would say, on behalf of the board of directors, that we must remember there may be circumstances connected with this company, as there are with all companies, which are only known to those who are entrusted with the charge of affairs, and which it would be highly imprudent for those gentlemen to make public—difficulties, if difficulties exist, which I have no doubt do exist, as in all companies—and therefore there must be a large measure of trust in the board who have so admirably managed our business for many years past. But I go back to this point that if the Chartered Company did not find it to their interest to absorb this company, we should never have heard of this scheme. And I want to ask you why it is that the Chartered Company has by degrees assimilated to itself and amalgamated other companies? Of course it is because the circumstances attending those companies made it essential to the prosperity of the Chartered Company that it should absorb them, and so prevent, I will not call it opposition, but that amount of difficulty which it experienced in finding those companies, although very much smaller, and supposed to exist under more trying circumstances, were enabled to supply gas at a cheaper rate than the larger company was in a position to do. It was the exceptional state of affairs that rendered it possible for one of these companies to supply one side of a street at a lower price than the Chartered Company could supply the other side, which rendered it necessary for the larger company to absorb the smaller company that had been heretofore conducted under more favourable conditions. I am speaking here before gentlemen who understand quite as well as I do that this was the leading motive with the Chartered Company in absorbing other companies. That company began in the year 1868 by absorbing the other companies which supplied the City of London, but in 1871 it took a general roving commission to absorb any other company within the metropolis, and it is under the power of that section in their Act that the scheme we are here to consider to-day has been propounded, in order to prevent the opposition, or comparative opposition, inevitable from this small company being able to supply gas better than they can do. It is that power in their Act, conjoined with the provisions in our Articles of Association, which admits of the dissolution of this company, which allows us to carry out the terms of this scheme. But, gentlemen, I want you to ponder this matter very carefully. It has hitherto been considered to be worth the while of the Chartered Company in every single instance in which an amalgamation of other companies has been effected to grant to those other companies preferential dividends of 10 per cent., and I want to know the exceptional circumstances in this company which prevent us from enforcing the same terms.

The CHAIRMAN: My friend Mr. Michael will allow me to state that this was not the case with the amalgamation of the City of London Gas Company. The chairman of that company is present, and I think he will confirm what I say that the amalgamation took place upon equal terms.

Mr. GRAY: Yes, that was so.

A PROPRIETOR: But that is the only instance.

Mr. MICHAEL: I am sorry that I am in error as to any matter of fact. I quite thought that in every case there was an absolute guarantee of 10 per cent., and I want to point this out as a most important matter. You see here by the terms of the clause which the chairman has read *in extenso*, w at an enormous amount of capital is invested by that company, and what man here is bold enough to predict that under the difficult circumstances of all companies—the Chartered Company amongst the rest—they will be able in the future to give the ordinary shareholders the 10 per cent. they have given them in the past? I have just two or three words to say upon that. And first with respect to the parliamentary powers of the Chartered Gas Company. Why was it that Parliament departed from the rule which I may say was absolute until last year—viz., to grant to companies applying for new capital a maximum dividend of only 7 per cent., and gave them power to pay 10 per cent? It was on account of the representations made by that company of the great difficulties incident to their position in being obliged to sweep away all their stations in the metropolis, and having to carry on their undertaking at a great distance from London, and convey their gas through mains of enormous size and such as had never been known before in the history of gas companies. Parliament, because of these difficulties, and because of the uncertainty of the experiment, and the possibility that for many years the shareholders will not receive the amount of dividend on their investments which they ought to receive, allowed them the power of dividing 10 per cent. whenever they could earn it. Now, gentlemen, carefully consider this. Every penny of that capital which is raised by the Chartered Company will diminish the value of your shares. Every penny raised, if you had preferential dividend, would be an additional guarantee to you. But the very enormous amount that company are obliged to raise renders it a matter of the gravest doubt whether in the future they will be able to pay 10 per cent. But I come back to this point. It is worth their while for certain purposes, into which I will not enter, to take us over, we paying at present 10 per cent., and with every probability of continuing to pay it, because there is an elasticity in our company which does not belong to a company established by Act of Parliament. The directors are going to take exceptional powers to-day, and I say we have a position unparalleled in the history of gas companies. We have all the advantages of parliamentary sanction without being put under parliamentary control. Before the Act of 1860 was passed we were in the position of not having parliamentary powers, but by the very admirable management of our directors and secretary we were so tacked on to that Act that we have all the benefits of incorporation while retaining our former advantages as a limited company. Under the Joint-Stock Companies Act, we can exercise our borrowing powers, and we can at any moment convert the money we borrow into share capital, with a dividend of 10 per cent. I say, therefore, there is no other company so favourably situated. And what are you going to do? I will not enlarge upon the difficulties of the Chartered Gas Company. I merely insist upon this as a great principle, that if it is worth their while to have us at all, it is worth their while (and if proper pressure is put upon them they will accede to it) to give us a preferential dividend of 10 per cent. I hope the shareholders will stick to that, and determine not to depart from it. Now, gentlemen, I do not wish to weary you, but I think it important that your attention should be called to these matters. What is the opinion of the public in reference to this proposed amalgamation? Was ever

the opinion of the public so strongly pronounced as it has been in this instance? I never knew it! My acquaintance with the shareholders of this company is, perhaps, limited, but I can only say that I have spoken to no one of intelligence and with any acquaintance with gas property who has not unequivocally condemned the step we are now asked to take. I have spoken to gentlemen who understand the subject thoroughly—gentlemen in the City connected with gas enterprises, and familiar with the difficulties arising out of the fluctuations in the coal market—and they have all expressed the same opinion. Gentlemen, I want to know what are the exceptional circumstances in the Chartered Company which prevent the difficulties said to attach to this company from attaching to them. Public opinion says that if we are in any difficulties so must they be, and that their difficulties must be multiplied in proportion to the magnitude of their concern. Can they buy coal cheaper than we can? I am sure our directors will not admit that. The same facilities are open to us as to them. Then remember, if there are difficulties pressing upon us, we have a reserve-fund of £30,000, the whole of which is available for the purpose of being divided amongst us, so as to make up any deficiency in our dividends for the next two, three, or five years. I say we are not in circumstances such as should drive us into taking a step which it is not agreeable for us to take. How have the public spoken on this matter by that which never gives a false note? Look at the quotations of this company's shares from the moment that the announcement of the amalgamation was made on the Stock Exchange. I speak for myself. I am a very young shareholder in this company, and bought my shares some months ago at 17½. The very instant this proposal was known on the Stock Exchange our shares fell 30s. Then, again, compare your prices, as I have done month by month, with the quotations of the Chartered, and you will find uniformly that your prices have ranged at least £1 higher than those of the Chartered Company; and yet, from some unknown circumstances, you are now about to give away a valuable property for something which is of less value. But I have another argument, and one which is of a most striking character. Even at this very moment—to-day—what is the quotation? The public believe that the shareholders of this company will never allow this scheme to be carried out; and, therefore, they are willing to give from 15s. to 20s. more per share for Western than for Chartered shares of the same nominal value. Could there be a stronger commentary on these proceedings? I say it is conclusive as to the state of public opinion, and I say that, taking it on general knowledge, there is nothing to be gained by the step we are asked to take. The chairman has very frankly told us that we shall have the opportunity, in the united company, of having shares allotted to us in any new issue which may take place. I say that is a matter of dubious advantage. The moment the Chartered Company's dividends fall below 10 per cent. there will be a fall in the value of our share capital; and, of course, every new issue of shares will be more than correspondingly depreciated. Now, I ask, have we any guarantee that in the present half year the 10 per cent. will be obtained? I say that, to a large extent, it is the profit derived by the Chartered Company from the surplus profits of amalgamated companies which has helped them to pay their maximum up to the present time, and that when this is exhausted there is no guarantee of the maximum continuing. We pay 10 per cent. to-day, and I think there is every chance of our continuing to do so; and, therefore, I say the step proposed to us is "a leap in the dark." I defy any one to say it is otherwise. I have the greatest confidence in the officers of the Chartered Company who have been consulted by our board, and in the accountants to whom the directors, with great wisdom, referred the examination of that company's accounts; but, as the chairman of a gas company myself, and having for years been an auditor of a London gas company, I say it is impossible for auditors to go into the office of a company and get a trustworthy report as to the profits likely to accrue in the immediate future. Therefore I say, unless we have a guarantee in the shape of a preferential dividend, we ought not to entertain this proposition. The chairman has stated to us, and it is perfectly true, that this scheme cannot come into force until it has been considered and passed by the Board of Trade. But, gentlemen, the Board of Trade will not regard your interests in the matter. They sit for exactly the opposite purpose—to consider the interests of the public as against you—and their sanction of the scheme will be no guarantee for one penny of dividend. It is, then, with great respect and deference to the board, and with great regret, that I differ from their views, and venture to propose the amendment which I have read.

A PROPRIETOR: May I venture to ask from whom the proposition for the amalgamation came?

The CHAIRMAN: I think on the last occasion the negotiations commenced with the Chartered Company, but it is a little difficult sometimes to say who takes the initiative when it is a matter of conversation.

The PROPRIETOR: Perhaps, sir, you would rather I did not press the question from whom the first proposition came?

The CHAIRMAN: The Chartered Company.

Another PROPRIETOR: Have you had any treaty with the London or Imperial Companies, because, looking at the map, it seems that the districts of those two companies are contiguous to ours, while that of the Chartered Company is separated by a long distance. With either of the others the working would be better. Has there been any negotiation or attempt at amalgamation with them?

The CHAIRMAN: There would be no power to do so without going to Parliament, when we should subject ourselves to limitations which we are not now under. The London and Imperial Companies are not in the same position as the Chartered and ourselves.

Mr. MORICE: I rise to second the amendment. In doing so I may say that I represent nearly 1000 shares in this company, and that I have no interest in any other company. As an investor myself, and as representing my friends, I must express the strongest objection to this scheme of amalgamation. The only thing in which I do not agree with Mr. Michael—and I say it with great deference to him, for he knows much more about these things than I do—is that this meeting has the power to sanction the amalgamation. As far as I have read the clauses in the Articles of Association of this company, the directors, first of all, have no power, and it is not within the scope of their authority to enter into any negotiations for the purpose. But I go further, and say that there is no power in this meeting to accept the terms now submitted to us. I am aware that there is a clause enabling us to dissolve the company, and we might exercise that power for the purpose of an amalgamation. But I fall back upon the constitution of the company. I find the directors may do certain things, but amalgamation is not one of the things they can do. What we can do under the Limited Liability Act is this—we may, by calling two meetings, alter our Articles of Association, and put into those Articles clauses enabling us to amalgamate, and then it will follow as a matter of course; but I do not think at this moment we are in a position to give effect to it. Passing by that, however, I took the liberty of asking the chairman to have the two clauses respecting the capital in the scheme read *in extenso*, so that the proprietors might see the enormous undertaking into which we are going to merge our small company. We are asked to join a company having three or four millions of capital, giving preferential dividends to other companies which it has absorbed, and proposing only to divide with us the residuum of the profits. Then with reference to our reserve-fund, it occurs to me, although perhaps this is a small thing, that as the other company have no reserve-fund, the fair proposition would be that we should retain our reserve-fund to make up any deficiency in our dividends, so long as it lasts. Mr. Michael has referred to the relative values of the shares of the two companies, and I may say that I have taken the trouble to go back for five years, to ascertain what the prices of those shares were during the months of February and August each year. For three of those years the shares of the Chartered Company were of the nominal value of £50, and, therefore, I have divided the price at which they are quoted by 5. Taking the average of the five years down to this present month of August, I find that the Western Company's shares have stood at 16¼, or £16 2s. 6d., and the Chartered Company's shares have stood at £12 2s., so that there has been a difference of more than £4 per share on every £10 during the whole of the period. But if we exclude the last two years, during which the amalgamations have very much improved the price of the Chartered Company's shares, I find that for the three preceding years the Western shares stood at £15 5s. on the average, while the Chartered were under £10 10s. Now, if we are buying, as we shall be, an interest in the undertaking of the Chartered Company, and paying £4 per £10 share for it, we shall be sacrificing the enormous sum of nearly one million of money.

A DIRECTOR: You have taken five years, which is rather a long period. Can you give us the last three years?

Mr. MORICE: There cannot be much difference. But put it in another way. There are, I believe, 60,000 shares in this company, and therefore if on the amalgamation we take shares in the Chartered Company, which, on the average of the last five years, have been worth £4 less than ours, we are virtually selling our undertaking for £240,000 less than it is worth. There is one very extraordinary reason assigned for it—*i.e.*, the price of coal. We have entrusted the management of this company to our directors, and this is a subject with which they are much more familiar than ordinary shareholders can be, but I for one am more disposed to run the risk of the coal market than accept this proposition. No doubt there will be a reaction, and I am willing to wait for that rather than embark in this great undertaking. With regard to the value of the Chartered shares, I do not know whether the gentlemen present are aware that within the last three years they have been at a discount—the £50 shares have been only worth £44.

Mr. GRAY: You are labouring under a great mistake.

The CHAIRMAN: I do not think it at all affects the question. If you refer to the price of the Great Central shares you will find they were at one time the same.

Mr. MORICE: I go by Whitehead and Coles's Circular, and I think I am not mistaken in saying that in May, 1869, the Chartered £50 shares were quoted at £44, and in August of that year at £46 10s. In February, 1868, more than five years ago, they were quoted at £43. But my general statement is that within five years they have been at a discount, and, if I am wrong, I have given my authority.

The CHAIRMAN: If you will carry your inquiry further back, you will find that our shares were not worth anything.

Mr. MORICE: All I know is that I have been a shareholder here for ten years, and have always had my 10 per cent. With regard to the remuneration of the directors in the united company, it is unusually and extensively large. To get the assistance of able men, I know you must pay them well for their services, but knowing what is the remuneration of the directors of the Bank of England, I think £10,000 a year is too much for the remuneration of the proposed united company. There are also in the scheme allowances on retiring of an unusually large kind; perhaps there is not much in it, but, taken with other things, it helps to strengthen the objections to the whole affair. I suppose, too, there will be an alteration in the staff.

The CHAIRMAN: I believe it will be very much as it was in the other cases.

Mr. MORICE: I dare say we shall lose the services of able persons, and shall have to pay them pensions. Then, as one not altogether unacquainted with gas matters, I cannot but think that the merging of independent companies into one great undertaking will give the Government greater power hereafter with regard to the reduction of the 10 per cent. maximum. I dare say, sir, you remember the story of the Roman emperor who expressed a wish that all his subjects had but one neck.

The CHAIRMAN: I think I have heard it.

Mr. MORICE: No company has worked better than this company during the last few years, and I think we shall find our 10 per cent. much more secure in the hands of our directors than in any others.

A PROPRIETOR: I think hereafter the whole of the London companies will be handed over to the Board of Works, with their 10 per cent. guaranteed.

Mr. MORICE: I have great respect for our directors, but I think the entering into these negotiations, without telling us what they were doing, was an unauthorized act on their part. It is not long ago that they told us in their report, with expressions of delight, that while other companies were amalgamating with the Chartered Company we were excluded from the scheme. This is their report in August, 1868:—"Mr. Cardwell thereupon threatened to pass the bill promoted by the corporation, empowering them, with the aid of their corporate funds, to enter upon a competition with, and which they avowed would be ruinous to, the three companies supplying gas in the City district. This threat caused those companies (first the Chartered, and subsequently the Great Central and City of London) to give way, and submit to the committee's exactions. 'The Metropolis Gas Bill,' which was intended to apply to all the companies, was then altered by the committee into what has since become 'The City of London Gas Act,' and its provisions are by the Chartered Company's Act applied to their districts outside the City. The Act materially affects the rights of the three companies included in it, but the Western Company, and the nine others which do not supply gas within the City limits, retain their statutory rights unaltered." At that time there was no power in the Chartered Company to absorb any other company, but a clause was slipped into their Act last year, the scope of which I am sure no shareholder in this company could possibly have understood. But it is under the power given by that clause this scheme is propounded, and it was brought under my notice quite unexpectedly one day while reading the money article of the *Morning Post*. I then learned, for the first time, that we had been sold—bound hand and foot—to the Chartered Company. I strongly object on my own part, and on behalf of those whom I represent, to the whole affair.

The CHAIRMAN: Allow me to say that I demur entirely to what the last speaker has said respecting our power to do this. We have submitted an elaborate case to eminent counsel, and are advised that we have the power.

Mr. MORICE: I do not say it cannot be done, but it must be done by altering first the deed of settlement. A clause giving power to amalgamate can then be put in, which must be approved at two successive meetings. There is a good deal of form to go through, and therefore what we do now will not carry the amalgamation.

Mr. GRAY: I have paid great attention to the remarks of the preceding speakers, and I may say at once that I have always been opposed to amalgamations. But with regard to my own company, the necessity was forced upon me. In 1868 we had to go to Parliament to meet the Chartered and the Great Central Companies, and the threat was then held out to us, that if we did not consent they would let in the corporation, and permit them to make gas and supply the City. I considered that our company was placed in a very perilous position, and though I was much indisposed towards amalgamation, it became a matter of duty to sanction it. But I have no hesitation in saying now that my subsequent intercourse with that company has convinced me that it was a very judicious arrangement. With regard to this company, it is

a matter for consideration whether it will be prejudicial or advantageous. The gentleman who has just addressed us says we ought to have a guaranteed dividend, but I should ill discharge my duty if I held out the slightest expectation that anything of that sort will be conceded. The matter has been discussed by the Chartered Company, but they will consent to no guarantee whatever. We shall be glad to associate with the Western Company, and our opinion is that in time you will find out you have done a very judicious thing. The amalgamation will tend to greater economy in working, and I have no hesitation whatever in saying that you will continue to have your 10 per cent. With regard to the state of the coal market, no doubt it is entirely exceptional; but then I must remind you that a great increase has taken place in the price of coke and the other residual products of gas manufacture, which, to a certain extent, neutralizes the effect of the enhanced cost of coal. Whether the high price of coal will continue no one can say; my own opinion is that it will be considerably dearer. With respect to the negotiations entered into by the directors, I believe they have not exceeded their powers; but they can conclude nothing without the sanction of the proprietors, and we are here assembled to endorse what they have done, or to disapprove of it. My deliberate opinion is that if the matter is carried out you will have no reason to regret it, and therefore I support the motion most cheerfully.

A PROPRIETOR: I really think we have a claim for a preferential dividend. Take the dividends of the Chartered Company for the last two years, the average is only 9 per cent., whereas we have paid 10 per cent. If we go back three years I find that their average is only 8 per cent.; ours has been 10.

Another PROPRIETOR: I hope the shareholders will not pass the resolution to-day without a guarantee of 10 per cent. I would rather go on as we are.

Mr. DOANE: The chairman, I think, was not explicit upon two points, one of which has reference to the period when the calls will be made. I want to know whether it will be imperative upon the united company to make those calls as stated. As a shareholder in the Chartered Company I have no confidence in them, and I think I have a grievance against them with respect to our B shares, which are struck out of all participation in the new capital. Perhaps the chairman will be kind enough to read that part of the scheme which makes it imperative on them to call up our capital within a given time. Another thing I should like to know is this—you say the Western shareholders are to divide rateably with the Chartered shareholders the new capital. Is that imperative? You state also that on the new capital we are to have 10 per cent. I expect the conditions will take the same form as the present 5 per cent. preference shares, and not come immediately into 10 per cent. The first issue of those shares does come into 10 per cent. till 1874, and the second not till 1876, and I am afraid the new capital will be tied down for some time to 5 for per cent.

The CHAIRMAN read the clauses in the scheme relating to the points raised by the last speaker, who said they were quite satisfactory.

A PROPRIETOR: Perhaps you will be kind enough to say whether you have sent out any proxies?

The CHAIRMAN: Yes, a very large number of shareholders have confided their proxies to us, but I shall be glad to carry every shareholder in this meeting with us on the question. With regard to the value of coke, I think I may go so far as to say that a large portion of the advance on the price of common coal is recouped to the companies by the enhanced value of the coke they make. As in the case of railways, we do not regard the advance in the price of iron as of the same importance as the rise in the price of coal, because the old rails bring us an increased price corresponding with the cost of the new. But, unfortunately, in this company we are in this position—our coke bears a very small proportion to what that article bears in other companies. I hope I am not to be provoked to enter into further explanations to assure you that we have weighed all these matters carefully. We do not want to proclaim to the world all the advantages the Chartered Company will have in taking to us, or what advantages we shall enjoy thereby. I may state that we have consulted some of our largest shareholders, and we have gone further with them than it would be proper to do here at the present state of the proceedings. They are satisfied with our explanations, and have confided to us the large powers we possess to-day.

Mr. GRAY: Under the Act of Parliament the Board of Trade may, in case the price of 3s. 9d. for gas fails to pay us a 10 per cent. dividend, raise that price so as to enable us to obtain it.

The CHAIRMAN: You will do us the favour, gentlemen, to remember that we are very large partners with you, and that all the circumstances of this case must be supposed to be better known to us than to you. Regard us, then, for the present as trustees, and believe we are doing that, which, rightly or wrongly, we believe to be essential to your interests. And now, first of all, I will acknowledge the great courtesy and the very great intelligence which my friend, Mr. Michael, has brought to bear upon this question. I only expected it from him, as, commercially, he is connected with gas matters as a shareholder; and then, in his capacity, as a member of the parliamentary bar, they have been brought before him in all their varied forms. I hope I shall be able hereafter to induce him to withdraw his amendment, although, I admit, it is a little difficult to convert a member of his profession. We are not acting under a panic in what we are doing, but are acting as men of business under convictions which have been upon us for the last three years. I may say that we can give notice to advance the price of gas, but then in some parts at the extreme bounds of our district we come into contact with the Chartered Company in the same street; they have power to undersell us, and you know the irritation which is produced in the public mind when one company is selling gas in the same locality lower than another—the position of things is at least inconvenient and awkward. It would be very difficult for us to go to Parliament asking for an increase of our powers; I question whether we should get it. You know how little sympathy we ever receive from Parliament in relation to our rating, and all their other dealings with us. Our present powers are unlimited with regard to extension, but we are extra parliamentary you must bear in mind. As to the question of the market value of our shares, I cannot follow that out, for I have never bought any shares during my 20 years connexion with the company, and I have not noticed the quotations. But there is another question to which I may refer. The Chartered Company have assumed a very different position since they have obtained larger powers, and their new station at Beckton has proved a success. As to our dividend as affected by the cost of coal, I have no need to remind you that our present 10 per cent. is the result of working under an old contract, and that the advance in the cost of coal has not as yet affected us very much. We are assured, from every source, that a 10 per cent. dividend in the united company, so soon as the existing exceptional rate of things has passed away, may be fairly counted upon. We believe it, and upon that we have acted. I do not know that I need say anything further, but I shall now propose the motion which I have read.

Mr. MICHAEL: One word in explanation. I have been a little misunderstood by Mr. Morice. I did not state that I consider the steps taken by the directors were legal; I consider it illegal, for, as I have already pointed out to them in private, I believe we are bound by the Articles of Association, and that an amalgamation can only be carried out by dissolving the company. I do not enlarge upon this; I only say I do not consider this is the proper step to be taken, but it would be folly to argue a legal question in a general assembly.

The CHAIRMAN: I will put the amendment if Mr. Michael still says he insists upon it.

Mr. MICHAEL: Oh, yes.

The amendent was then put, and, on a show of hands,

The CHAIRMAN said the amendment was carried.

Mr. GRAY: I demand a ballot.

The CHAIRMAN: I will state to you the condition of the proxies if you think it worth while under the circumstances.

A PROPRIETOR: You do not mean to use them?

The CHAIRMAN: Certainly, they were confided to us for that purpose.

A PROPRIETOR: Why did you send them out in your name?

The CHAIRMAN: You know, if you are familiar with the use of proxies, you could have struck out my name and put in another.

A PROPRIETOR: I was not aware of that.

The CHAIRMAN: That I cannot help.

Mr. MORICE: I quite agree that the proxies should have been sent out in blank.

The CHAIRMAN: Well, gentlemen, if we have been guilty of an error I am sorry for it.

Mr. MICHAEL: Will Mr. Barber be kind enough to read the Article of Association which permits the board of directors to send out stamped proxies or proxies at all. Under what article is it?

The SECRETARY read the 85th article.

Mr. MICHAEL: Excuse me, that is no answer to my question. This merely shows the mode in which they shall be issued and kept. I want to know where is the power of the directors to send out proxies at all, to solicit votes, or to send out stamped proxies, *i.e.*, to use the funds of the society to get votes in order to carry out their policy.

The SECRETARY: This article implies that proxies are to be used if necessary. Under the general powers of the company I dare say we shall find powers to the directors.

The CHAIRMAN: I think we may take it for granted there are general powers under which we could do it. If we have misappropriated any part of your funds we must answer for it.

Mr. MICHAEL: But that is not the question. Have you any powers under the Articles of Association which enable you to depart from the general law that the directors of companies have no power to issue stamped proxies or to obtain votes? I ask what power you have.

The SECRETARY: Under the head of "Powers and duties of directors" there are these clauses (read 115 to 117).

Mr. MICHAEL: That is a power for carrying out the ordinary business of the company, but not for dissolving it.

Mr. GRAY: I think it is a pity to raise a technical objection now. Whatever the result may be, we ought to go on with the business.

Mr. MORICE (to Mr. Michael): Do you object to the proxies?

Mr. MICHAEL: Certainly.

Mr. MORICE: I beg that that objection may be recorded.

The CHAIRMAN: If you will hand in anything I will record it.

The SECRETARY: The number of votes by proxy in favour of the scheme is 5189; against it, 196.

The CHAIRMAN: Now is it worth while to trouble the proprietors to go to a ballot?

Mr. MICHAEL: No; certainly not.

Mr. MORICE: I am sorry to take up the time of the meeting, but I must request, with a view to ulterior proceedings, that the ballot may be taken. I did not hear the numbers.

The CHAIRMAN: The number of shareholders voting for the scheme is 236; the number of shares fully paid up, 16,788; of D shares, 8621; and the number of votes is 5189 for the scheme. Against it there are 603 fully paid-up shares, and 621 D shares—that is, 196 votes, as opposed to the 5189 votes; and still you say you wish to have the ballot taken.

Mr. MICHAEL: Scrutineers would have to be appointed. I am quite content that Mr. Barber has been through the proxies, and that that is the official result.

Mr. MORICE: I am content to take them as the secretary has given them, but I wish that the result of the poll should be stated in the usual way.

The CHAIRMAN: For form's sake, I put it.

Upon a show of hands the amendment was carried, and a poll being demanded, it was decided that the amendment was lost.

A PROPRIETOR: The amendment was not lost if the proxies are illegal.

Mr. MICHAEL: You must put the original proposition now. We shall carry a vote against it, and you must put in your proxies in favour of it, You had better do it formally, because if we take any proceedings we shall take advantage of any irregularity.

The original motion was then put, and, on a show of hands, was lost.

The CHAIRMAN: I now put in the proxies, and I declare it to be carried. I now move—"That this meeting hereby authorizes the borrowing of such an amount of money from time to time as the directors shall think proper, not exceeding £150,000, in addition to the sum of £50,000 authorized by the Special Court of Proprietors, held on the 28th of June, 1855, making together the aggregate sum of £200,000.

Mr. MAKINS seconded the motion.

Mr. DOANE: You give no limitation as to the rate of interest. I think it should be limited to 5 per cent., and that you should state whether the money will be raised by debentures or bonds.

A PROPRIETOR: I think the chairman should state for what purpose the money is required. There is still £200,000 uncalled on shares. It is monstrous.

The CHAIRMAN: What is monstrous? This provision is made for the benefit of the joint company, to be exercised at any time when they think it is for the benefit of the joint company. We ourselves would not have required it.

The PROPRIETOR: Then let them call it up after we have amalgamated, and not this company.

The CHAIRMAN: The Chartered Company have only a limited borrowing power. We have the power to create this capital, and we propose to do it to-day. Ir will not be used unless for the benefit of the amalgamated company, and perhaps not at all. If we do not bring this power into exercise to-day there is no opportunity to do it hereafter.

Mr. GRAY: It is obviously for the interest of the company to have this power.

The CHAIRMAN: We have added to the motion—"At not exceeding the rate of 5 per cent. per annum, either by debentures or debenture stock."

The motion, as amended, was put and carried.

This closed the business of the extraordinary meeting.

The Half-Yearly Ordinary Meeting was then held.

The SECRETARY read the notice convening the meeting. The seal of the company was affixed to the register of proprietors, and the following report and statements of account were taken as read:—

The directors submit to the shareholders the annexed statement of accounts for the year ended the 30th of June last. The gas and meter rental, amounting to £157,679, exceeds that of the year ended June, 1871, by £9304. In the return for coke and other residuals there is an increase of £865. The divisible profit which has resulted from the year's operations is £44,104 0s. 5d., the sum required for the authorized distribution of 10 per cent. on the share capital being £41,000. The directors recommend that the following dividend, at the usual rate per cent., less income-tax, be declared for the second half of the financial year, viz:—10s. per A, B, and C share, fully paid; 1s. per D share, £1 paid. Mr. R. Eykyn, M.P., Gen. Sir Henry George Andrew Taylor, K.C.B., and Mr. F. Edwards, directors, and Mr. Thomas James Briggs, auditor, retire by rotation, and respectively offer themselves for re-election.

Revenue.

Dr.				*Cr.*			
Coal	£31,499	0	1	Gas	£153,958	16	4
Supervision and labour	17,783	11	0	Meter rental	3,720	18	8
Purifying materials, water, oil, and sundries	3,129	11	6		£157,679	15	0
Works renewal	5,833	3	2	Coke	6,886	13	6
Restoring pipes and meters	3,154	12	10	Breeze	2,535	8	9
Lamp-lighting	2,150	18	1	Tar	3,137	5	9
Repairing lamps	672	5	0	Gas liquor	1,887	12	10
Direction and audit	1,870	0	0		14,447	0	10
Salaries	4,290	8	10	Transfer fees	30	15	0
Collectors' commission	1,644	5	0				
Rents, rates, and taxes	3,059	5	3				
Stationery and printing	315	11	0				
Incidental expenses	642	2	6				
Bad debts	848	11	6				
Leasehold Redemption Fnd.	265	2	0				
Profit of year to June 30, 1872, carried to profit and loss account	44,999	3	1				
	£172,157	10	10		£172,157	10	10

Profit and Loss.

Dr.				*Cr.*			
Reserved fund	£8,188	19	3	Balance from June 30, '71	£28,188	19	3
Interest on loans	895	2	8	Less dividnd. declared Aug., 1871	20,000	0	0
First half year's dividend, declared February last	£20,000	0	0		£8,188	19	3
Balance to be appropriated	24,104	0	5	Revenue Account (Profit of year to June 30, 1872)	44,999	3	1
	£44,104	0	5				
	£53,188	2	4		£53,188	2	4

General Balance-Sheet.

Dr.				*Cr.*			
Proprietors capital—viz.— 40,000 A, B, and C sh. (£10 each)	£400,000	0	0	Permanent investment	£407,665	13	1
20,000 D sh. (£1 paid)	20,000	0	0	Sundry debtors	32,248	2	10
	£420,000	0	0	Stock-in-trade	15,775	1	11
Bonds	5,000	0	0	Reserved fund—viz.— £32,820 18s. 5d. Consols and half year's interest to date	30,848	16	9
Sundry creditors	17,278	14	1	Cash in hand	11,996	12	1
Unclaimed dividends	255	13	0				
Reserved fund	30,848	16	9				
Leasehold redemption-fund	1,047	2	5				
Profit (balance to be appropriated)	24,104	0	5				
	£498,534	6	8		£498,534	6	8

The CHAIRMAN briefly moved the adoption of the report.

Mr. EDWARDS seconded the resolution, which, after two or three explanations on matters of account, was put and carried.

On the motion of the CHAIRMAN, the dividends recommended in the report were declared.

The retiring directors and auditor were re-elected.

A vote of thanks was given to the chairman and directors for their services, and the chairman having acknowledged the same, the proceedings terminated.

THE ALUM AND AMMONIA COMPANY, LIMITED.

The Thirteenth General Meeting of this Company was held at the Works, Lombard Road, Battersea, on Friday, Aug. 23—A. ANGUS CROLL, Esq., in the chair.

The SECRETARY (Mr. Guyatt) read the notice calling the meeting and the directors report, which was as follows:—

It affords the directors much pleasure to lay before the shareholders, in this the ninth year of the company's existence, the accompanying balance-sheet, duly audited for the year ending June 30, 1872.

Alum and the other manufactured products of the company have been in good demand at remunerative prices, and in consequence the statement of accounts now presented is more favourable than any of its predecessors.

During the past twelve months the works and plant at the various establishments of the company have been maintained in the highest state of efficiency. In addition to the ordinary wear and tear, the works formerly at Nine Elms have been re-erected at Battersea (and extended), at a cost of £1953 8s 1d., and new apparatus has been erected at Bow and at Glasgow, costing £1250 1s. 4d., together £3203 9s. 5d., which has been charged against revenue.

The directors feeling assured that the shareholders would desire to see the new works at Battersea, have arranged that the present general meeting should be held there instead of at Bow, as heretofore.

The only charge to capital is £1000 for the purchase of a piece of freehold land at Bow. Mr. Croll purchased this some years since, and gave the company the option of taking it at cost price any time during seven years, which has now been done.

After charging the extra expenses before mentioned and the interim dividend paid in February, the balance now to be dealt with is £19,927 6s. 10d.

The directors therefore propose to pay the usual dividend at the rate of 10 per cent. per annum, free of income-tax, making with that paid in February, 10 per cent. for the year, which will leave a balance of undivided profits of £15,703 9s. 2d.

The stock accounts at the London works are certified by Mr. Odling, those at the Glasgow works by Dr. Fraser and Mr. Nicholson.

The directors who retire at this meeting are Dr. Fraser and F. A. M. Nicol, Esq., and, being eligible, they offer themselves for re-election.

The shareholders auditor also retires, and, being eligible, offers himself for re-election.

The dividend warrants will be handed to the shareholders who may be present at the meeting.

The CHAIRMAN, in moving the adoption of the report and accounts, said: Gentlemen, the statement laid before you is so satisfactory that I need say little as a supplement to it. The alum and other products manufactured by this company are well known as good and pure articles, and have been in good demand. During the year we have obtained £1 10s. per ton more than some other makers for a large part of our alum, and it is, of course, by attention to the markets that good prices are obtained and good dividends secured. After paying you the usual dividend, we carry forward an amount nearly equal to two years dividend, and I have no doubt you will agree with me that this is a source of congratulation. At these works, as you will have observed, we have a large stock of valuable material. Speaking of stocks reminds me (as it doubtlessly will Mr. Buss) of an instance connected with stock-taking which caused him some fear some time since, and although the stocks were as carefully taken then as now, yet, to remove all apprehension from the minds of shareholders, the directors appointed committees to superintend the annual stock-taking. As stated in the report, the stocks at Glasgow were taken by Dr. Fraser and Mr. Nicholson, and those in London by Mr. Odling. No doubt you will some of you inquire at what values the stocks have been taken. I will tell you. Alum is taken at 15 per cent., sulphate of ammonia and naphtha at 17½ per cent., patent ammonia at 33 per cent., and pitch at about 100 per cent. less than present selling prices. Notwithstanding this very favourable state of affairs, we do not propose to increase the dividend beyond the usual 10 per cent., and I may say that the directors are unanimous in this recommendation, and I trust that no suggestion will be made to divide any of the balance carried over, as the board will consider it their duty to oppose any suggestion of the kind. When the undivided profits amount to £30,000 or £40,000 it may then be a matter for consideration as to the division of the whole of the profits as made, but till then the directors consider a secure 10 per cent. dividend better than a fluctuating one. With these few remarks I now beg to move that the report and accounts be received, adopted, and entered on the minutes.

Mr. NICHOLSON seconded the motion, and in doing so said: It is not necessary for me to add to the remarks of the chairman. One thing, however, I must say in explanation of apparent inconsistencies in the 1st and 5th paragraphs of the report. It is there stated that while this is the ninth year of the company's existence, the option to purchase the land at Bow was only binding on Mr. Croll for seven years. That is so, but with his usual generosity in his dealings with the company he afterwards extended the option until it was quite convenient to the company to purchase it. As to these premises, they are most eligibly situated for the company's operations, and although the rent paid is larger than for the Nine Elms works, still the facilities afforded compensate in a great measure for this increase. We are prepared to let part of the premises, and yet have sufficient for our requirements, and if the shareholders would bear this in mind we might secure a good tenant through their instrumentality. I also agree most heartily with the chairman's suggestion that a certain 10 per cent. dividend is better than a fluctuating one, and that the surplus year by year, after paying this dividend, should accumulate until it amounts to £30,000 or £40,000.

Dr. FRASER explained the mode adopted by the committees in the matter of stock-taking.

Mr. BRADING proposed the re-election of Dr. Fraser and F. A. M. Nicol, Esq., as directors of the company, and in doing so endorsed the views of the chairman as to dividend, and congratulated his brother shareholders upon the large balance carried over after payment of the handsome dividend.

Mr. C. FLOWER seconded the motion, which was carried *nem. dis.*

Dr. FRASER and Mr. NICOL returned thanks.

Mr. HAMMOND proposed the re-election of the shareholders auditor.

Mr. STAPLETON seconded the motion, and it was carried unanimously.

Mr. DOWLING, in highly eulogistic terms, proposed a vote of thanks to the chairman and directors for their able and successful management of the affairs of the company.

Mr. BUSS seconded the motion, which was carried by acclamation.

The CHAIRMAN returned thanks, and asked the shareholders to accord a vote of thanks to the secretary.

Mr. FLOWER seconded, and suggested that this might be a fitting opportunity for presenting him with a bonus, but at the request of the secretary the proposal was not seconded; at the same time he thanked the shareholders for the kind manner in which they had received the suggestion of the vote of thanks to him proposed by the chairman.

The CHAIRMAN, in reference to the suggestion of Mr. Flower, said it was somewhat irregular on the part of shareholders to interfere in the matter of the remuneration of the company's officers, the board being the proper judges, and it might be attended with considerable inconvenience if made a precedent of. As the matter had been referred to, he would suggest that 100 guineas be presented to the secretary for special services rendered during the year. This suggestion was adopted, and the secretary returned thanks.

A vote of thanks to the auditor closed the proceedings.

LIVERPOOL UNITED GAS COMPANY.

The Half-Yearly Meeting of the Shareholders of this Company was held on Tuesday, Aug. 20, in the new Offices, Duke Street—Mr. THOMAS EARLE, chairman of the directors, presiding.

Mr. GARNETT, the solicitor to the company, read the following report of the directors:—

The company's accounts for the past financial year show the income to have amounted to £314,377 11s. 6d., and the expenditure to £249,993 7s. 8d., leaving a balance of profits of £64,384 3s. 10d. The directors recommend payment to the proprietors of the usual dividend for the half year ending the 30th of June last—viz., at the rate of 10 per cent. per annum on the consolidated stock of the company, and £7 per cent. per annum on the paid-up capital of the new shares. After providing for this dividend there will remain a surplus of £2552 19s. 8d. applicable to the reserve-fund.

The directors have much pleasure in announcing the completion of the new offices in Duke Street; and it must be gratifying to the proprietors to learn that the greatly increased accommodation which will be by this means available has been acquired without any additional cost to the company.

The directors retiring by rotation are Charles Turner, Esq., M.P.; John Campbell, Esq.; C. W. Neumann, Esq.; and James Lister, Esq.; all of whom are re-eligible. The retiring auditor is the Rev. G. Sandbach, who is also eligible for re-appointment.

Mr. CROSBY, the manager of the company, submitted the financial accounts for the half year.

The CHAIRMAN, in moving the adoption of the report, which he characterized as a very satisfactory one, said it was gratifying to be able to record a maximum dividend in an exceptional year like the present; but such a course was, he thought, warranted by the present prosperous state of the company. With regard to the works, they had found it necessary to incur additional expenses for works at Linacre, and they had bought land at the north and south end of the town, which would enable them to make such additions to their works as might from time to time be considered necessary. Up to the present time the directors had not made any increase in the price of gas, but the advance in the price of labour and the difficulty of getting cannel and other coal pointed to the possibility of an increase in the price of gas. At present, however, they should continue to charge the same prices as heretofore. He trusted the shareholders would like the new building, which was a very convenient one, and reflected great credit upon Mr. Littler, the architect. The chairman concluded by moving the adoption of the report.

This was seconded by Mr. CAMPBELL, and carried unanimously.

In reply to a question by a shareholder, it was stated by one of the directors that a call of £5 per share would probably be made upon the new shareholders in January next.

The retiring directors and the auditor were re-elected, and the proceedings concluded with a vote of thanks to the chairman and to the directors for the satisfactory manner in which they had conducted the affairs of the company, which was duly responded to by the chairman.

FORFAR GAS CORPORATION.—At a special meeting of the Gas Commission, held on Monday, August 12, Provost Whyte in the chair, it was agreed, in terms of the report by the convener of the Gas Committee, Mr. Alex. Lowson (published in our last), to reduce the price of gas to the consumers from 5s. 10d. to 5s. per 1000 cubic feet. The last year's profits, after paying the annuities, in terms of Act of Parliament, were £823; and it is calculated that, even with the largely increased price of coal, £400 will be cleared during the current year.

FAVERSHAM GAS COMPANY.—The annual meeting of the shareholders of this company was held on Wednesday last—Mr. George Prentis in the chair. The accounts were passed, and a dividend of 10 per cent. on the share capital was declared. (The debenture holders receive 6 per cent. at a subsequent period of the year.) Directors and auditors having been elected, it was unanimously resolved, in consequence of the enormous increase in the cost of coals and freights, that on and from the 1st of October next the price of gas to private consumers be increased from 5s. to 5s. 6d. per 1000 feet, and that the present allowance of 5 per cent. discount on accounts paid within a month be discontinued. A vote of thanks to the chairman closed the meeting, and the shareholders afterwards dined together in accordance with their usual custom.

EDINBURGH AND DISTRICT WATER TRUST.

A Meeting of the Water Trustees was held on Thursday, the 8th inst.—the Lord PROVOST presiding.

The CLERK read the following queries submitted to counsel (the Solicitor-General and Mr. Macdonald) on behalf of the trustees, and answers thereto:—

1. Whether there is any, and if so, what limitation on the memorialists right to the water (including flood water) of the Glencorse Valley above the Crawley gauge? 2. Whether the memorialists are entitled to draw off a greater quantity of water from the Glencorse Valley than the maximum quantity which the present pipe will carry, without being liable in additional compensation to landowners, millowners, and others. 3. Whether under their existing statutory powers the trustees are entitled to lay down a second pipe or enlarge their present pipe from Glencorse for the purpose of carrying off such greater quantity of water? 4. Whether such second pipe or a larger pipe can be laid down by the trustees under their existing statutory powers without the consent of the landowners through whose lands the track runs, keeping in view that no title can be found to a portion of the existing pipe track? 5. Whether under their existing statutory powers the trustees are entitled to construct additional reservoirs so as to provide for additional storeage on lands belonging to them, or which they may purchase at Glencorse? 6. Whether the memorialists may lawfully apply the sum of £10,400 in their hands, realized from property sold, and any sum they may borrow under the power conferred on them by sec. 75 of their Act of 1869, towards the cost of forming additional reservoirs at Crawley, and laying an additional pipe from Crawley to Edinburgh? 7. Whether the memorialists can levy a lower water-rate upon shops and offices than the maximum rate of 3d. per pound specified by clause 66 of the Act of 1869? 8. Whether the memorialists can levy a differential rate upon shops and offices not supplied direct with water, different from that levied upon those receiving a direct supply? 9. Whether, having regard to the latter portion of section 70 of their Act of 1869, the memorialists have power, if so inclined, to impose any rate, including a fractional part of a penny?

Opinions 1, 2, 3, 4, and 5. We are of opinion that the memorialists cannot, without obtaining statutory powers, store up or carry to Edinburgh more water from the Glencorse Valley than can be stored or carried to Edinburgh by the existing works—(*a*) because the memorialists have under the Act of 1869 no fund provided, nor power given to raise funds to execute the additional works which would be necessary; and (*b*) because all questions of water compensation which were settled when the former Acts were obtained must in our opinion be held to have been settled with reference to works of the extent authorized by these Acts. 6. We are of opinion that this sum cannot be applied under the Act of 1869 and the Acts incorporated with it. 7. In our opinion the memorialists are entitled to levy a lower rate than the maximum of 3d. per £1 upon shops and offices. 8. We are of opinion that the memorialists are not entitled to levy a different rate on shops and offices not supplied with water from that levied on those who draw a supply. 9. The memorialists are in our opinion entitled to levy rates including a fractional part of a penny, the statutes only protecting them from being compelled to do this were it not thought expedient.

Mr. MACDONELL remarked it was a pity the trustees had not got the opinion of counsel sooner, because it might have saved them the money they were spending in investigating the resources of the Pentlands.

The LORD PROVOST: That just shows the wisdom of going to St. Mary's Loch.

Bailie COUSIN differed from Mr. Macdonell, and thought it was important they should know the capabilities of the Pentlands.

Mr. WORMALD did not think the opinion of counsel would affect Mr. Hawksley's views. Besides, the amount of additional compensation they would have to give could not be very large.

Mr. ARCHIBALD believed that if the opinion now given had been known by the Lord's Committee on the St. Mary's Loch Bill, that bill would have been passed.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

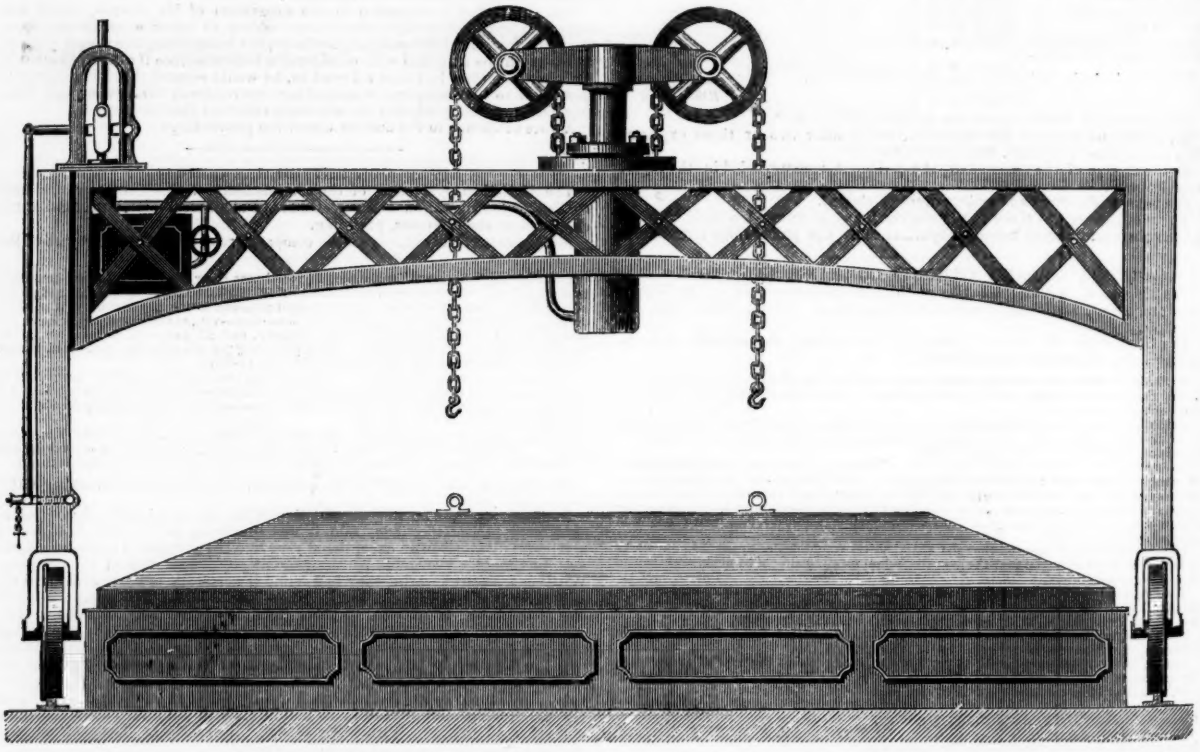
ANNUAL GENERAL MEETING.

(*Continued from page* 701.)

Mr. J. REID submitted the appended paper:—

ON THE APPLICATION OF HYDROSTATIC PRESSURE FOR LIFTING AND LOWERING THE HEAVY IRON COVERS OF PURIFIERS IN GAS-WORKS.

When engaged, during the summer of 1869, in the preparation of plans for extensions in the works of the Edinburgh and Leith Gas Company, including the erection of a number of large dry lime purifiers, I visited two or three of the larger works, and consulted with some of the most extensive manufacturers of gas apparatus, with the view, if possible, of improving the mechanical arrangements generally in use for lifting and moving about the heavy covers of purifiers. But my inquiries came to no account. These covers, as you all know, when large, weigh tons in weight; and, considering the frequency of opening and closing these vessels, I became satisfied that the usual contrivances of swing cranes, crab-winch, and other heavy and cumbrous lifting tackle,



which, besides being very expensive, and difficult to keep in safe working order for any length of time, were not well contrived or adapted for the operation. And, being about to erect a range of purifiers, about 16 feet square, I set myself to consider whether a better method might not be devised for effecting the simple operation, and the use of hydrostatic pressure at once suggested itself as being very specially applicable to raising such weights, especially as the range of lift does not exceed 2 or 3 feet in height.

The apparatus being forthwith completed in design, was erected at the works, where it has been in use without accident or repair ever since.

Before going further, never having taken any steps to invite public notice, I think the present a fit occasion to express my belief that this improvement, whatever it may be worth, was new and original at the time I first devised and made use of it. My plans and specifications thereof having found their way in the ordinary course of business into some of the leading manufacturing establishments, I am neither surprised nor displeased that the idea should have been at once appreciated, and that, under a variety of modifications, it has already been adopted in some of the larger gas-works of the country.

The diagram shows the general appearance of the apparatus, which consists of a travelling carriage, having strong cast-iron standards or cheeks at the ends, furnished with flanged wheels or rollers fitted to a line of floor-rails extending in parallel lines, and laid immediately outside the whole length of the range of purifiers.

These cheeks are connected by wrought-iron latticed girders, about 1 foot apart, and stretching across and over the purifiers from cheek to cheek; and when thus braced together, the whole travelling carriage can be easily rolled along and over the whole range of purifiers.

In the middle and in the space between the girders is fitted a strong cast-iron cylinder, with stuffing-box at top, through which a solid wrought-iron piston or ram works up and down, as the water is forced into or let out of the cylinder. The top of the ram or piston is furnished with a strong wrought-iron cross-head, about 4 feet long, forked at both ends for the reception of two strong chain pulley-wheels, which rise or fall with the piston.

The two lifting chains resting in the grooves of the wheels have their inner ends nearest to the piston firmly fixed by studs into the strong top flange of the cylinder, and their outer extremities, terminating with hooks, depend from the outer sides of pulleys, and immediately over the strong wrought-iron lifting eye-bolts of the purifier covers, to which the hooks are attached when the process of lifting is to be performed.

A small water cistern is inserted between the girders, near the outer standard of carriage, and over the cistern is a small forcing-pump, worked by a hand lever near the floor, and the feed water is thus conveyed from the pump by a small wrought-iron pipe to the bottom of the forcing cylinder.

A single man at the pump is sufficient to lift up the covers, in a minute or two at most, and all the joints being tight, the cover remains suspended at the height attained for any length of time. The carriage being rolled away while the purifier is being changed, is brought back, and, on being returned to its position, a small cock, mounted with a wheel handle, is slightly turned, and, opening a passage from the lifting cylinder, allows the water to escape back into the cistern and the cover to be lowered to its place in the purifier with the greatest gentleness and precision.

The only other point to be noticed is that, being desirable to accomplish the lift of the cover, which extends to 2½ or 3 feet, by the shortest possible cylinder and ram, I succeeded (as will be seen from the diagram) in accomplishing this point by *fixing the inner ends of the chains*; and the effect, as will be observed, is that every foot of rise or lift of the crosshead is accompanied by the

ascent of the purifier cover to a height of 2 feet, or double the distance travelled by the ram.

Mr. G. R. Hislop: The arrangement of Mr. Reid's invention is admirably adapted for the purpose intended. By this apparatus one man can do what otherwise would require six. As a proof of the importance of the invention, I may state that it was adopted in Glasgow for the rearrangement of the gas-works there, a year or two ago. Where the arrangements of the purifying-house are such as demand such an apparatus, I know of none better than Mr. Reid's, as, by a small jet of water, the ponderous covers are raised with great ease.

Mr. B. M. M'Crae: Was it Mr. Reid's invention, or a modification of it, that was adopted in Glasgow?

Mr. G. R. Hislop: Mr. Reid's.

Mr. B. M. M'Crae: I have heard of another apparatus of the kind, in which the hydraulic ram forms part of the lute of the purifier, and then there is a little wheel put in and carried along. The principle is the same, but that plan was recently adopted. An apparatus for lifting purifiers was much required, as that operation is always attended with great expense and danger.

Mr. G. R. Hislop: The merit of the adoption of the use of water power for this purpose belongs to Mr. Reid.

On the motion of the President, seconded by Mr. G. R. Hislop, Mr. Reid was cordially thanked by the association for his paper.

Mr. Laurence Hislop (Ayr) read the subjoined communication:—

EXPLOSION OF TUBULAR CONDENSER AT THE AYR GAS-WORKS.

Many of you are, no doubt, already aware of an explosion which occurred in a tubular condenser at the Ayr Gas works, in the month of April last; and, as to me the cause is involved in mystery, it is with the view to this being ascertained, and the prevention of similar explosions elsewhere, that I have been induced to lay the following particulars before you, trusting the subject may receive, as it is worthy, your attention and consideration.

At the works of the Ayr Gas Company, as at many others throughout the country, steam is employed for cleaning purposes. A supply was laid on from the steam boiler to and along the whole length of the condenser in front by a 1½-inch malleable iron tube, from off which a branch was taken into each of the five divisions into which it is divided, as shown on sketch, each being furnished with a stop-cock, and jointed into the condenser with bat-lead.

It was found necessary to have steam introduced into the washer also, which is situated somewhat nearer the steam boiler than the destroyed condenser; and, in order to insert the required tee-branch, the 1½-inch tube had to be disconnected at the washer over which it passed; and while the fitter was in the act of reconnecting same, an explosion of great violence, without any warning, took place, reducing the condenser to fragments.

The condenser had been out of use for a period of two months, and the inlet and outlet valves were shut off, as also were the five stop-cocks on the steam-tube connecting the condenser shut, and so found after the explosion had occurred.

The fitter effecting the alteration, whom I have always found to be faithful, denies having used a light in any way, or for any purpose whatever, no other workmen being present at the time. I myself had not left the spot more than two minutes before the accident occurred.

It is to be expected that the condenser was charged with an explosive mixture of gas and common air, but I am at a loss to see how this could be ignited—first, from the supposition that there was no light; and secondly, from the fact of the stop-cocks being shut.

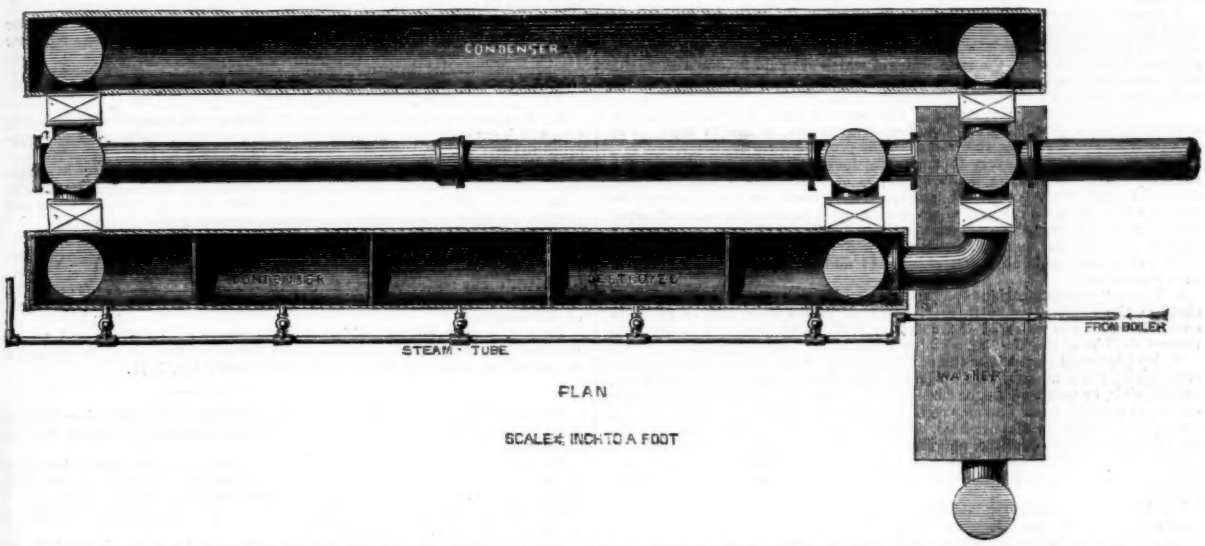
The points upon which I invite your opinion and court discussion are—

1. Supposing one of the stop-cocks slightly leaky, could a spark from the fitter's tools have exploded the contents of the condenser?

2. May it not have been produced by the formation of some detonating substance around the mouth of the steam-tube inside the condenser, and which the jar or vibration of the tube might detonate, igniting the mixture inside the condenser?

The President: I have known instances of a slight explosion being caused by a spark from a workman's tool. I would suggest that Mr. Hislop's paper, along with Mr. Reid's, be remitted to Mr. Fowlis (Glasgow), Mr. M'Crae, and myself, as a committee. Our thanks are due to you, Mr. Hislop, for your paper. In every case of danger like this, inquiry is absolutely necessary.

Mr. G. R. Hislop: Perhaps Dr. Macadam may throw some light on the subject.



Dr. Macadam: I can throw very little light on it. The difficulty is to find out where the light came from. There must have been some light near the condenser. A spark from a workman's tool might have been perfectly sufficient to cause the explosion, and the same may be said of a lucifer match struck or trod upon. It is very curious to see how stupid workmen are regarding such matters.

Mr. B. M. M'Crae: What distance, Mr. Hislop, was the end of the open pipe from the boiler or fire?

Mr. Hislop: Between 40 and 50 feet.

Mr. B. M. M'Crae: Had the workman a match in his pocket?

Mr. Hislop: He had no matches.

Mr. B. M. M'Crae: Does he smoke?

Mr. Hislop.: He is a smoker, but his pipe was cold. I discovered it to be so immediately after the accident. I only left the spot two minutes before the explosion took place, and returned not more than half a minute after the occurrence.

Mr. Whimster: Perhaps, in striking a match, he ignited the gas instead of his pipe. It occurs to me that this is a matter which should be dealt with seriously. If it is possible that such a thing should happen mysteriously, notwithstanding all possible precautions, it is very serious for gas managers. I am disposed to believe that the workman has been mistaken in some way. The stop-cocks may have been inadvertently left open. I do not think it would be possible, through a leaky stop-cock, to explode the condenser. Through small openings gas will not explode. In the absence of the formation of a detonating substance, I would fall back on the theory that the man was smoking.

Dr. Macadam: I quite agree with Mr. Whimster. It would require the stop-cock to be open before an explosion could occur. Were the stop-cock open, the light would be communicated back.

The President: What state were the stop-cocks in, Mr. Hislop?

Mr. Hislop: I did not take the man's word in respect to the condition of the stop-cocks. I examined them for myself, and found every one of them shut. A small tube had broken away from the condenser, and all the stop-cocks were closed on it.

Mr. B. M. M'Crae: Were there two explosions?

Mr. Hislop: Only one. The mystery of the thing is the shutting of the stop-cocks.

Mr. Key (Dumbarton): How far were the pieces blown?

Mr. Hislop: A piece weighing ½ cwt. was carried a considerable distance.

Mr. G. R. Hislop: Perhaps Dr. Macadam will say whether there is any explosive substance which could be formed inside the condenser. I think the picrate of ammonia might be an agent in that way.

Dr. Macadam: I do not know if the picrate of ammonia was ever found in condensers. I am not aware of any other substance that could be formed in the condenser to lead to an explosion.

Mr. Key: Possibly some of the tubes inside were split.

The subject then dropped, the president's suggestion of the remit of Messrs. Hislop and Reid's papers to a committee being adopted.

(To be continued.)

REGULATIONS UNDER THE "METROPOLIS WATER ACT, 1871."

The following Minute has just been issued by the Board of Trade:—

Council Chamber, Whitehall, Aug. 10, 1872.

Whereas it is provided by the Metropolis Water Act, 1871, that every company subject to the provisions of that Act, shall, within six months after the passing of the said Act, make regulations for the purposes for which regulations may be made under the authority of section 26 of the Metropolis Water Act, 1852, and that the provisions of that section shall apply also to the preventing of undue consumption or contamination of water:

And whereas by the said Metropolis Water Act, 1871, it is further provided that no such regulation shall be of any force or effect unless and until the same be submitted to and confirmed by the Board of Trade, who may institute such inquiry in relation thereto as they shall think fit, and who, at such inquiry, shall hear the metropolitan authority and the company, if desiring to be heard, and the said board shall, if they think fit, or if requested, nominate and have present at such inquiry, to advise and assist them, a competent and impartial water-works engineer:

And whereas it is by the said last-mentioned Act also provided that no such regulation shall be confirmed by the Board of Trade unless notice in that behalf shall have been given by the company to which the same relates, or by such person as the Board of Trade direct, in the *London Gazette*, and in two daily morning newspapers circulated within the limits of the said Act one month at least before the inquiry, and that one month at least before any such inquiry is held, a copy of the regulations in question shall be sent by such company or person to the office of the metropolitan authority, and the same shall for one month be kept open during office hours at the respective offices of the metropolitan authority and of the said company, to the inspection of all persons without fee or reward:

And whereas the metropolitan water companies and the Tottenham Local Board made regulations, in accordance with the provisions of the above-named Act, and submitted the same to the Board of Trade for confirmation, and duly advertised and deposited the same with the metropolitan authorities:

And whereas the Metropolitan Board of Works and the Corporation of the City of London, being metropolitan authorities under the said last-mentioned Act, submitted objections to the said regulations, and it was deemed expedient that an inquiry should be held in relation thereto:

And whereas by the Board of Trade Inquiries Act, 1872, it is provided that wherever in any Act of Parliament it is directed that an inquiry shall be held or instituted by the Board of Trade, the same shall be deemed to have been duly held or instituted, if conducted by any person or persons duly authorized in that behalf by the president of the said board, by writing under his hand or under the hand of one of the secretaries of the said board:

And whereas the Board of Trade, under the powers conferred upon them as aforesaid, appointed the Right Honourable Lord Methuen, Henry Whatley Tyler, Esq., late captain Royal Engineers, and Robert Rawlinson, Esq., C.E., C.B., to hold an inquiry in relation to the regulations so submitted to them by the companies and by the Tottenham Local Board:

And whereas the said inquiry has been held, and the said metropolitan

authorities, and the companies and the local board have been heard at the inquiry:

And whereas, as the result of such inquiry, it has appeared expedient to the Board of Trade to allow such and so many of the said regulations as are contained in the schedule hereto annexed, with such modifications and alterations as are shown in the said schedule:

Now, therefore, the Board of Trade do hereby confirm the said last-named regulations so modified and altered as aforesaid.

C. P. FORTESCUE.

SCHEDULE REFERRED TO IN THE ABOVE MINUTE.

1. No "communication-pipe" for the conveyance of water from the water-works of the company into any premises shall hereafter be laid until after the point or place at which such "communication-pipe" is proposed to be brought into such premises shall have had the approval of the company.

2. No lead pipe shall hereafter be laid or fixed in or about any premises for the conveyance of or in connexion with the water supplied by the company (except when and as otherwise authorized by these regulations, or by the company), unless the same shall be of equal thickness throughout, and of at least the weight following, that is to say:—

Internal Diameter of Pipe in Inches.	Weight of Pipe in lbs. per lineal Yard.
¾-inch diameter.	5 lbs. per lineal yard.
¾ " "	6 " "
¾ " "	7½ " "
1 " "	9 " "
1 " "	12 " "
1½ " "	16 " "

3. Every pipe hereafter laid or fixed in the interior of any dwelling-house for the conveyance of, or in connexion with, the water of the company, must, unless with the consent of the company, if in contact with the ground, be of lead, but may otherwise be of lead, copper, or wrought iron, at the option of the consumer.

4. No house shall, unless with the permission of the company in writing, be hereafter fitted with more than one "communication-pipe."

5. Every house supplied with water by the company (except in cases of stand-pipes) shall have its own separate "communication-pipe." Provided that, as far as is consistent with the special Acts of the company, in the case of a group or block of houses, the water-rates of which are paid by one owner, the said owner may, at his option, have one sufficient "communication-pipe" for such group or block.

6. No house supplied with water by the company shall have any connexion with the pipes or other fittings of any other premises, except in the case of groups or blocks of houses, referred to in the preceding regulation.

7. The connexion of every "communication-pipe" with any pipe of the company shall hereafter be made by means of a sound and suitable brass screwed ferrule or stop-cock with union, and such ferrule or stop-cock shall be so made as to have a clear area of water-way equal to that of a half-inch pipe. The connexion of every "communication-pipe" with the pipes of the company shall be made by the company's workmen, and the company shall be paid in advance the reasonable costs and charges of and incident to the making of such connexion.

8. Every "communication-pipe" and every pipe external to the house and through the external walls thereof, hereafter respectively laid or fixed, in connexion with the water of the company shall be of lead, and every joint thereof shall be of the kind called a "plumbing" or "wiped" joint.

9. No pipe shall be used for the conveyance of, or in connexion with, water supplied by the company, which is laid or fixed through, in, or into any drain, ashpit, sink, or manure-hole, or through, in, or into any place where the water conveyed through such pipe may be liable to become fouled, except where such drain, ashpit, sink, or manure-hole, or other such place, shall be in the unavoidable course of such pipe, and then in every such case such pipe shall be passed through an exterior cast-iron pipe or jacket of sufficient length and strength, and of such construction as to afford due protection to the water-pipe.

10. Every pipe hereafter laid for the conveyance of, or in connexion with, water supplied by the company, shall, when laid in open ground, be laid at least 2 ft. 6 in. below the surface, and shall in every exposed situation be properly protected against the effects of frost.

11. No pipe for the conveyance of, or in connexion with, water supplied by the company, shall communicate with any cistern, butt, or other receptacle used or intended to be used for rain water.

12. Every "communication-pipe" for the conveyance of water to be supplied by the company into any premises shall have at or near its point of entrance into such premises, and if desired by the consumer within such premises, a sound and suitable stop-valve of the screw-down kind, with an area of water-way not less than that of a half-inch pipe, and not greater than that of the "communication-pipe," the size of the valve within these limits being at the option of the consumer. If placed in the ground such "stop-valve" shall be protected by a proper cover and "guard-box."

13. Every cistern used in connexion with the water supplied by the company shall be made and at all times maintained water-tight, and be properly covered and placed in such a position that it may be inspected and cleansed. Every such existing cistern, if not already provided with an efficient "ball-tap," and every such future cistern shall be provided with a sound and suitable "ball-tap" of the valve kind for the inlet of water.

14. No overflow or waste pipe, other than a "warning-pipe," shall be attached to any cistern supplied with water by the company, and every such overflow or waste pipe existing at the time when these regulations come into operation shall be removed, or, at the option of the consumer, shall be converted into an efficient "warning-pipe," within two calendar months next after the company shall have given to the occupier of, or left at the premises in which such cistern is situate, a notice in writing requiring such alteration to be made.

15. Every "warning-pipe" shall be placed in such a situation as will admit of the discharge of the water from such "warning-pipe" being readily ascertained by the officers of the company. And the position of such "warning-pipe" shall not be changed without previous notice to and approval by the company.

16. No cistern buried or excavated in the ground shall be used for the storeage or reception of water supplied by the company, unless the use of such cistern shall be allowed in writing by the company.

17. No wooden receptacle without a proper metallic lining shall be hereafter brought into use for the storeage of any water supplied by the company.

18. No draw-tap shall in future be fixed unless the same shall be sound and suitable, and of the "screw-down" kind.

19. Every draw-tap in connexion with any "stand-pipe," or other apparatus outside any dwelling-house in a court or other public place to supply any group or number of such dwelling-houses shall be sound and suitable and of the "waste-preventer" kind, and be protected as far as possible from injury by frost, theft, or mischief.

20. Every boiler, urinal, and water-closet in which water supplied by the company is used (other than water-closets in which hand flushing is employed) shall, within three months after these regulations come into operation, be served only through a cistern or service-box, and without a stool-cock, and there shall be no direct communication from the pipes of the company to any boiler, urinal, or water-closet.

21. Every water-closet cistern or water-closet service-box hereafter fitted or fixed in which water supplied by the company is to be used, shall have an efficient waste-preventing apparatus, so constructed as not to be capable of discharging more than two gallons of water at each flush.

22. Every urinal cistern in which water supplied by the company is used other than public urinal cisterns, or cisterns having attached to them a self-closing apparatus, shall have an efficient "waste-preventing" apparatus, so constructed as not to be capable of discharging more than one gallon of water at each flush.

23. Every "down-pipe" hereafter fixed for the discharge of water into the pan or basin of any water-closet shall have an internal diameter of not less than one inch and a quarter, and if of lead, shall weigh not less than nine pounds to every lineal yard.

24. No pipe by which water is supplied by the company to any water-closet shall communicate with any part of such water-closet, or with any apparatus connected therewith, except the service cistern thereof.

25. No bath supplied with water by the company shall have any overflow waste-pipe, except it be so arranged as to act as a "warning-pipe."

26. In every bath hereafter fitted or fixed the outlet shall be distinct from, and unconnected with, the inlet or inlets; and the inlet or inlets must be placed so that the orifice or orifices shall be above the highest water level of the bath. The outlet of every such bath shall be provided with a perfectly water-tight plug, valve, or cock.

27. No alteration shall be made in any fittings in connexion with the supply of water by the company without two days previous notice in writing to the company.

28. Except with the written consent of the consumer, no cock, ferrule, joint, union, valve, or other fitting, in the course of any "communication-pipe," shall have a water-way of less area than that of the "communication-pipe," so that the water-way from the water in the district-pipe or other supply-pipe of the company up to and through the stop-valve prescribed by Regulation No. 12, shall not in any part be of less area than that of the "communication-pipe" itself, which pipe shall not be of less than a half-inch bore in all its course.

29. All lead "warning-pipes," and other lead pipes of which the ends are open, so that such pipes cannot remain charged with water, may be of the following minimum weights, that is to say:—

½-inch (internal diameter)	3 lbs. per yard.
¾ " " "	5 " "
1 " " "	7 " "

30. In these regulations the term "communication-pipe" shall mean the pipe which extends from the district-pipe or other supply-pipe of the company up to the "stop-valve" prescribed in the Regulation No. 12.

31. Every person who shall wilfully violate, refuse, or neglect to comply with, or shall wilfully do or cause to be done any act, matter, or thing, in contravention of these regulations, or any part thereof, shall, for every such offence, be liable to a penalty in a sum not exceeding £5.

32. Where, under the foregoing regulations, any act is required or authorized to be done by the company, the same may be done on behalf of the company by an authorized officer or servant of the company; and where, under such regulations, any notice is required to be given by the company, the same shall be sufficiently authenticated if it be signed by an authorized officer or servant of the company.

33. All existing fittings, which shall be sound and efficient, and are not required to be removed or altered under these regulations, shall be deemed to be prescribed fittings under the Metropolis Water Act, 1871.

COLOMBO GAS AND WATER COMPANY, LIMITED.—The following telegram from Colombo has been received:—"Colombo successfully lighted with gas on Saturday, Aug. 10."

ELLAND GAS COMPANY.—The half-yearly meeting of the shareholders in the Elland-cum-Greetland Gas Company, for the purpose of receiving the report, declaring a dividend, electing directors and auditors, and the transaction of other business, was held on Monday, Aug. 12. The usual dividend at the rate of 10 per cent. per annum was declared.

ANDOVER GAS COMPANY.—The half-yearly meeting of the shareholders was held on Tuesday, Aug. 6. The working for the past half year, owing to the high price of coal, iron, &c., was below the average; there were, however, some surplus profits from the preceding year, and the company decided not to increase the price of gas (as has been done in most places), but to work on another half year, hoping the exceptional state of things may by that time subside. The usual dividend of 7 per cent. per annum was declared.

MELTON MOWBRAY GAS COMPANY.—The annual meeting of shareholders was held on the 9th inst.—Mr. T. Ward in the chair. A dividend of 15s. per share for the half year, making 7½ per cent. per annum on the nominal capital, was ordered to be paid on the 19th inst. The retiring directors were unanimously re-elected. It was resolved that £31 12s. be paid to the auditors, managing directors, and the board of directors, and that the salary of the clerk be increased £20 per annum. The manager, Mr. Loumes, reported the works and plant in a very efficient state. Notwithstanding the great advance in the price of coals, it was resolved not to increase the price of gas to consumers.

ROCHESTER AND CHATHAM GAS COMPANY.—The half-yearly meeting of the shareholders was held on Thursday, Aug. 8—Mr. J. Whittle, chairman of the board of directors, presiding. The usual dividend of 10 per cent. on the old shares (£50) and 7 per cent. on the new shares (£12 10s.) was declared, the chairman announcing that, notwithstanding the high price of coals, no advance in the price of gas would be made, the late reduction in price being still maintained. At the close of the meeting the directors and shareholders dined together at the Bull Hotel, Mr. J. Whittle presiding, with Mr. Syms, secretary, in the vice-chair.

MONMOUTH GAS COMPANY.—The half-yearly meeting of shareholders was held on the 6th inst.—Alderman Watkins in the chair. The report read by Mr. Skymer, the clerk showed that the result of the working permitted the declaration of a dividend at the rate of 5 per cent. per annum, with a bonus of 5s. per share. The chairman, in moving the adoption of the report, alluded to the increase of the coal account, and said that, unless the price of gas was raised, the company could not continue to pay the same dividend on future occasions. The clerk reported that after all expenses were paid there would still be some slight balance in hand, and that the directors did not think it necessary either to raise the gas or decrease the dividend. They had paid from 12s. to 15s. a ton until July for coal, and were now paying 21s. 6d. for the same. In all probability the coal expenses next year would be £200 instead of £100, and they would have to draw upon the reserve-fund. The report was adopted, the retiring directors re-elected, and votes of thanks given to the chairman, directors, and clerk.

BARNSTAPLE GAS COMPANY.—The half-yearly meeting of the shareholders of this company was held at the Assembly Rooms on Monday, Aug. 12. The chair was taken by Dr. Richard Budd. The following is the directors report:—"Your directors beg to report that the accounts for the half year ending March 31 have been audited and found to be correct, and they are now open to the inspection of the shareholders. Your directors are pleased to announce that the work of reconstruction of the premises is proceeding as rapidly as possible, and that that portion of the retort-house which has been finished is

found perfectly satisfactory in every respect. The materials for the erection of new purifiers have arrived on the premises, and, during the present week, the contractor's workmen will be engaged in setting them up. Much has already been done towards making the works as perfect as possible for the economical manufacture of gas, but more remains to be accomplished, and for the satisfactory completion of the works your directors will require the authority of the shareholders to exercise further borrowing powers. Your directors, therefore, request that you will empower them to raise, by way of mortgage, such further part of the money authorized by the Special Act to be borrowed, as they, in their discretion, shall think necessary. Your directors cannot but view with grave concern the present high price of coals and labour, especially as the maximum price for gas is already charged. They trust, however, and believe, that the present condition of things will not be permanent, and your directors beg to assure the shareholders that they will continue to conduct the business in every department with the utmost economy, consistent with efficiency." The report was received and adopted.

HUNTINGDON AND GODMANCHESTER GAS COMPANY.—The sixteenth annual general meeting of the shareholders was held on Thursday, the 2nd inst.—the Earl of Sandwich in the chair. The Secretary read the report of the directors, which stated that the business of the company is still progressive, but the board fully anticipate that the great increase in the price of, and the difficulty of obtaining coals, together with the advance in the price of labour and iron, will seriously affect the future prospects of the company, unless adequate protection be afforded to the shareholders by an increased price for gas and coke. The balance-sheet showed a sum of £1172 19s. 2½d. available for dividend and reserve, but having regard to the circumstances already stated, the board recommended that the reserve-fund be increased £200, and that a dividend of 7½ per cent. only for the past year be declared upon the company's capital of £12,000; this would leave a balance of £72 19s. 2½d. to be carried to the credit of the current year. In order to meet the present and anticipated increased expenditure of the company, and pay a fair dividend, it was absolutely necessary to raise the price of gas and coke, and the board recommended that the price of gas be increased as follows:—To private consumers, 1s. 3d. per 1000 feet; to manufacturers, common brewers, keepers of public buildings, and public lamps, 10d. per 1000 feet; and that coke be sold at £1 1s. 8d. per ton. It was proposed by Mr. Henderson, seconded by Mr. Yeardye, "That so much of the foregoing report as relates to the dividend and reserve-fund be adopted, printed, and circulated." It was proposed by Mr. Cluff, seconded by Mr. Faithfull, "That a dividend of 8 per cent. be declared, instead of 7½ per cent. as recommended in the report." The original proposition was carried. It was proposed by Mr. Beart, seconded by Mr. Bull, and carried unanimously, "That so much of the report as relates to an increased price of gas and coke be adopted, printed, and circulated." It was also unanimously resolved, "That the directors have discretion to increase or lower the prices of gas and coke, after the expiration of three months from the 1st of September next, as they may deem necessary or expedient." The Earl of Sandwich was unanimously re-elected chairman of the company; Mr. Balfour, auditor; Messrs. F. C. Armstrong, Bull, and Hearn, directors; and Messrs. J. Ingram and R. Edis were also unanimously elected in the room of Samuel Edward Cooch and David Veasey, Esqs., deceased. A vote of thanks to the chairman closed the proceedings.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN JULY, 1872:—

JULY, 1872.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	July, 1871. 0°	July, 1872. 0°	July, 1871. 0°	July, 1872. 0°	0°
Distilled Water . . .					
West Middlesex water .	16·94	18·24	0·78	0·68	0·000
Grand Junction water. .	17·41	18·70	0·78	0·70	0·000

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During the month, the water supplied to the parish by the West Middlesex and Grand Junction Water Companies was perfectly clear and transparent, and although the analyses have shown that the amount of solid matter contained in it was slightly in excess of last year—that is to say, there was some little increase in its hardness—yet in the amount of its organic matter there was a decrease.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN JULY, 1872:—

JULY, 1872.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	*Mean of 25 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas . . .	16·44	16·70	15·40	26·46	9·38	28·38	0·53	None.
Chartered Company's common gas	16·80	17·70	16·16	39·33	16·18	13·59	0·70	None.
Chartered Company's cannel gas	23·85	24·80	22·60	30·44	14·38	21·80	0·86	None.

Mean of daily readings of barometer . . . . 29·74
" " " thermometer . . . 74·35

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

PUBLIC LIGHTING AT SWANSEA.—At the meeting of the Local Board of Health, on the 10th inst., a report was read from the Gas Committee. It stated that tenders for supply of gas to the public lights had been advertised for. Only one had been received, and it was from a person who offered to supply gas at 2s. 3d. per 1000 feet, and to put it into a meter provided by the board. The committee had not accepted the tender, but they asked to be allowed to continue their sittings. Mr. Jones Jenkins said that persons who were in the habit of constructing gas-works would not tender at the present time in consequence of the great increase which had taken place in the price of iron within the past eighteen months. Such an increase had not taken place within the memory of the present generation. The committee were, however, anxious to continue their sittings, and probably the price of iron would sooner or later be reduced. There was a letter from the gas company, in which the company, with their usual legal knowledge, said that the board had no right to accept tenders for a longer time than three years. The clerk read a letter from Mr. Thornton Andrews on behalf of the company, to the effect that the company were willing to tender for the supply of gas for three years, "that being the time, as they understood it, for which the Board of Health can legally invite tenders." Mr. James Rogers said that the sitting of the committee would do no good. It was a pity the time and energy of the committee should be wasted, as perhaps the members might injure their health. The report was adopted, and the committee, therefore, will continue their sittings.

THE NEW OFFICES OF THE SHEFFIELD GAS COMPANY.—Tenders for the new offices which are about to be erected by the Sheffield United Gaslight Company, in Forge Lane, have just been sent in and disposed of, the architects being Messrs. M. E. Hadfield and Son, Sheffield. The following are the particulars:—Mr. Neill (Manchester), £29,550; Mr. Shaftoe, £29,380; Messrs. Longmire and Burge, £27,990; Mr. Dennett, £26,870; Mr. Carr (Sheffield), £26,455; Mr. Warburton, £25,000; Messrs. J. and H. Chambers (Sheffield and Bishops Monckton), £24,375. The last named has been accepted.

GREENOCK NEW GAS-WORKS.—The unsuitable situation of the present gas works, combined with the growing requirements of the town, induced the authorities, while carrying through Parliament their Improvement Act of 1871, to obtain powers therein for the erection of new and larger works, which should be capable of meeting the wants of the inhabitants in the matter of gas for a considerable length of time. The new site selected is Inchgreen Island, a piece of ground extending to between seven and eight acres, and which at high tide is surrounded by the water of the Clyde. It is situated at the extreme east end of the burgh bounds, and lies to the north of the Greenock and Port Glasgow public road. Operations have been in progress for some months, but the extremely wet weather which has prevailed has greatly retarded the work. Notwithstanding, much has been accomplished, and it is expected that early in 1873 matters will be so far advanced as will justify the entire supply of the town being undertaken from Inchgreen. Three tanks—two of 124 feet and one of 102 feet—have already been excavated, and the brickwork of a couple nearly completed. The tank walls are most substantial, being upwards of three feet thick at the base, and are puddled behind with clay. The earth excavated has been utilized in raising the outskirts of the ground, and about two acres have thus been added to the original area. The purifying-house (95 feet long) and lime shed are well forward—they are roofed, and some of the necessary apparatus is being put in. The largest erection is the retort-house, 175 feet long and 25 feet high, with a chimney rising from the centre of the building to a height of 109 feet. The space on either side of the stalk will be occupied by 28 double retort benches or ovens, but only one-half will be constructed in the meantime. Attached is the necessary tar-house, 75 feet long by 34 broad. Of course, a large meter-house is included in the plans, which include smith and joiner shops (finished), offices, engine-house, and workmen's room. It is also intended to transfer the tank presently in use in the old works, near the Albert Harbour, to Inchgreen. At one time it was contemplated to have a connexion with the Caledonian Railway, and the plans were prepared with that view, but for various reasons the idea has meanwhile been abandoned, and, instead, a jetty is in course of construction, whereat coals, &c., may be discharged. Workmen are busily employed laying down 2-feet iron pipes from the works into the town, and fully two-thirds of the distance has already been got over. The whole, when completed, it is estimated, will cost from £50,000 to £60,000. Mr. York is contractor, and the new work has been undertaken by Messrs. Hanna, Donald, and Wilson, of Paisley. Mr. Stewart, manager of the old works, is engineer, and the entire operations are being prosecuted under the inspection of Mr. John Thomson, Greenock.

LAMPLIGHTERS STRIKE AT EDINBURGH.—The Cleaning and Lighting Committee of the Corporation of Edinburgh, not having complied with the demand of the men employed by them, to light the public lamps, for an increase of 2s. per week in their wages, a strike took place on the 13th inst. Mr. Paterson, the inspector of lighting and cleaning, took immediate measures for supplying the places of those on strike, and nearly all the beats were filled before night, and during the day many of the lamps were left lighted, in order that, in the event of a sufficient number of men not being forthcoming by night time, the city should not be left in darkness. Several incidents worthy of notice have arisen out of the strike. At the police court, on the 13th, before Bailie Miller, John Musgrove and William Robertson, glaziers, were charged with having unlawfully extinguished the light of one or more of the public lamps in Frederick Street and Queen Street. Mr. Paterson, the inspector of lighting, said that on Monday night an order was given, at the instance of the Cleaning Committee, to leave the lights burning all day, so that the streets might not be left in darkness should a sufficient force of lamplighters not be found by night to replace those on strike. The accused said they were guilty, but they thought they would be doing a service by putting out the lights. The bailie asked if they were willing to become lamplighters. They both said they were not, but one expressed his willingness to light the lamp he put out, as he was employed in the vicinity. They were each fined £1, with the alternative of five days' imprisonment. On the following day, George Thomson, carter, pleaded guilty of having been riotous and disorderly in Cockburn Street on Tuesday. Mr. Paterson, inspector of lighting and cleaning, said the prisoner attacked one of the new lamplighters, while he was lighting the lamps in Cockburn Street, between six and seven o'clock in the evening. The bailie said that every man had a perfect right to stand out as long as he liked for an increase of wages, but none had a right to intimidate others who took their places. The prisoner should not have the option of a fine, but must go to prison for ten days. Alexander Clunas was charged with having been riotous and disorderly in High Street on Tuesday. The prisoner, in pleading guilty, said he was only speaking to the lamplighters, and advising them to stand out for their own. The bailie imposed a fine of 5s. On Friday, the 16th, before Sheriff Hamilton, Peter M'Bride, lamplighter, residing in Carrubber's Close, Edinburgh, appeared to answer to a complaint at the instance of Mr. Paterson, charging him with having deserted his employment without having given, as he should have done, four weeks notice. Mr. John Innes, appeared for the complainer, and Mr. Daniel Turner for the respondent. Mr. Paterson, on being examined by Mr. Innes, deposed that, several years ago, M'Bride entered into his employment, and that, by the rules for regulating the lamplighters of the city, which formed part of the contract between the parties, he was bound to give four weeks' notice before leaving. In particular he had bound himself by a minute, dated Sept. 4th, 1866, and signed by him, not to quit his employment without giving that notice in writing. The respondent continued in the service of the witness down to Tuesday, Aug. 13; but he had since illegally, unwarrantably, and in violation of his contract of service, absented himself without having given the notice which he had undertaken to give. The amount of compensation which the complainer claimed for this breach and non-performance of the contract was £5. In reducing his staff in May he always gave four weeks notice to the men. On Monday, Aug. 5, he got a letter from the lamplighters, stating that they had unanimously resolved not to work any longer at their present rate of pay, that they wanted an increase of 2s. per week, and that if this increase were not granted they would cease work on the 13th inst. He remonstrated with them on the absurdity of the position they had taken up; and they then said virtually that they withdrew the threat to strike on that date. He accepted the withdrawal, and told them that he had no doubt the Lighting Committee would consider their petition at once, and that he would give all the assistance he could in getting their wages up. On the 9th instant, however, he received intimation from them that it had been resolved that no man should instruct or learn until the dispute was settled; that the men had pledged themselves to support one George Leslie in his refusal to teach a man who was placed under his instructions; that they adhered to their original

notice served on witness on the 5th of August; that if any man or men should be dismissed in consequence of the agitation, all the lamplighters would cease work until that man or those men were restored to their places; and that no man would turn out to water the streets on Tuesday morning, the 13th instant, unless the dispute was settled. The defendant was convicted, and a fine of £5, with 21s. costs, was imposed; failing payment in four days, a warrant to be granted for his imprisonment for ten days. Similar evidence to that in the above case was given in complaints against C. Riley and J. Feegan, Mr. Turner refraining, after the decision of M'Bride, from putting any questions to the witnesses, and in each instance a similar judgment was pronounced by the sheriff. In a complaint against George Leslie, which Mr. Turner said he thought somewhat different from the others, the respondent himself was examined, and said that it had not been his intention to strike. He would have put out his lamps on the Tuesday morning as usual, but for the instruction which he had received from Mr. Paterson not to do so. He was opposed to strikes. In this case, however, the men had not been allowed to strike. He had heard Mr. Paterson say that if they did not withdraw the letter which they had sent to him—on Monday, Aug. 5, the witness was understood to say—not one of them would ever be taken back again. Leslie afterwards admitted, in answer to Mr. Innes, that he too had signed the letters which the men had sent to Mr. Paterson. Charles Riley said he had understood that as the pay was weekly, the notice to be given was weekly. Peter M'Bride stated that he regarded the intimation which he received from Mr. Paterson not to put out any of the lamps on the Tuesday morning as a dismissal from his service. It was quite possible that before ten o'clock on the morning of that day the men might have resolved to continue at their work. The sheriff did not think there was any distinction possible to be made between the case of Leslie and the other cases which had been heard, and therefore his judgment must be the same.

Gas Explosion in Paris.—A serious gas explosion occurred on Tuesday, Aug. 13, about half-past nine in the morning, in the new offices of the Ministry of Finance, opposite the Hôtel du Louvre. Four messengers of the department in which the scrip of the new loan is being stamped were severely burnt, three of them now lying in a critical state. The material damage was not great, although several boxes of important papers were destroyed. The disaster was caused by an escape of gas, which had been perceived by the clerks on the previous evening, but no steps appear to have been taken to remedy it.—*Galignani.*

Robbery at the Birmingham Gas-Works.—At the Birmingham Police Court, on the 12th inst., Henry Aitkins, carter, Windsor Street, was charged with stealing 40 lbs. of iron, of the value of 2s. 9d., from the premises of the Birmingham Gas Company. The prisoner is in the service of a carman who does work for the company, and on the previous Saturday, at noon, after filling his cart with bricks for conveyance to another part of the town, an *employé* in the yard noticed the prisoner place on the cart a bag, which on being examined was found to contain several pieces of iron. The metal had been taken from the "scrap heap" which was near to the spot where the prisoner was loading the bricks. The engineer to the company said that petty robberies of scrap iron from their premises were very common, but they could never find where the property went. The prisoner pleaded guilty, and was sent to gaol for six weeks.

Cambridge University and Town Water-Works Company.—An extraordinary meeting of the shareholders of this company was held on Friday, Aug. 16, at the office of the company, Bene't Street, for the purpose of creating and issuing new shares. The Rev. Dr. Okes, Provost of King's College, who presided, explained that £500 was wanted at once—an amount which capital account owed to revenue—about £500 more was wanted for extension of mains, and a similar sum for other purposes. He therefore moved, in accordance with the notice given, that 3250 new ordinary shares, of the value of £2 each, be created and issued under the Company's Act, 1866. This was seconded by Mr. E. Smith. Mr. Haylock thought it a pity to increase the shares, inasmuch as it must diminish the income of the old shareholders. Mr. Allen asked if there was any necessity for creating so much capital to raise £1500. The chairman replied to the question, and pointed out that one-third of the present wants existed in extension of mains, which showed that the business of the company was increasing; and the secretary (Mr. S. Peed) added that it did not follow that the creation of new shares would reduce the dividend to old shareholders. It was stated that the shares, which would be called up only as wanted, would be issued at par to shareholders; and the secretary observed that he had had applications for new shares. The proposition was then put and carried unanimously. The proceedings concluded with a vote of thanks to the chairman.

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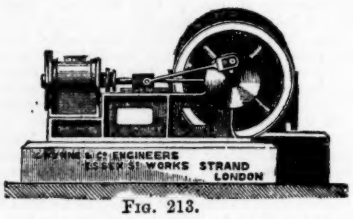

Fig. 213.

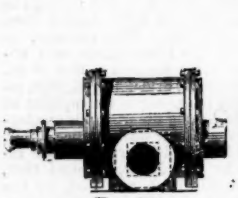

Fig. 211.

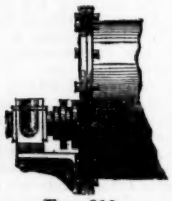

Fig. 219.

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CONTENTS.

	Page
Death of Thomas Greaves Barlow, Esq., C.E.	757
Notes upon Passing Events:—	
The Effects of the Licensing Act	757
The Speaker and Co-operative Farming	757
Naval Education	758
Work for Government	758
Horse-Breeding	758
Agricultural Machinery	759
M. Thiers and Protection	759
Circular to Gas Companies:—	
The New Metropolitan Gas Referees	759
A Reply from the late Referees	759
Mr. Flintoff again	759
Dr. Macadam on the Manufacture of Gas from Paraffin Oil	759
The Sheriff in the Town-Hall, Ryde	760
How to Avoid Arbitration	760
The Meeting of the Patent Gas Company	760
Changes of Price	760
Miscellaneous News:—	
Meeting of the Ratcliff Gas Company	760
Nenagh (Ireland) Gas Supply	760
Lincoln Water-Works Purchase	760
Meeting of the Wolverhampton Gas Company	761
Bolton Gas Supply—Last Meeting of the Bolton Gas Company	761
Glasgow Corporation Gas-Works	762
Major Bolton's Report on the Metropolitan Waters for the Month ending Aug. 16	762
Meeting of the South Staffordshire Water Company	762
Meeting of the Berlin Water Company	763
North British Association of Gas Managers	763
Supplement to the Referees Report on the Sulphur Purification at Beckton	768
Chester Gas Company	771
East Barnet Gas and Water Company	771
Huddersfield Corporation Gas-Works	771
Gloucester Gas Company	771
Longton Gas Company	771
Limerick Corporation Gas-Works	771
Canterbury Gas and Water Company	771
Wakefield Gas Company	771
Price of Gas at Hereford	772
Public Lighting at Hereford	772
The Extraordinary Outrage at the Rossendale Union Gas-Works	772
Proposed Purchase of the Dewsbury and Batley Gas-Works	772
Strike against the Advance in the Price of Gas at Rastrick and Clifton	772
Public Lighting at Aberdeen	772
Public Lighting at Huntingdon	772
Fatal Accident at the Chartered Gas-Works	772
Fatal Accident at Hebburn	772
The Ryde Gas-Works Question	772
Manchester Gas Supply	772
The Gas and Water Question in Durham	772
Return by the Metropolitan Association of Medical Officers of Health of the Average Composition and Quality of the Metropolitan Waters, in August 1872	773
Wisbech Water-Works Company	773
Greenock Water Trust	773
West Surrey Water Company	773
Rochester and Chatham Water-Works Company	773
The Water Supply of Liverpool	773
Bradford Water Supply	773
Register of New Patents:—	
Verity, J.—Chimneys for Gas-Burners	774
Muschamp, J. B.—Liquid-Meter	774
Wall, C.—Air-tight Holder or Vessel	774
Matthews, C. P.—Gas-Pendants, &c.	774
Lacey, F.—Ventilating Rooms	774
Chastelain, C. de—Intercepting Sewage	774
Greenstreet, T. G.—Cleansing Streets	774
Wilson, M.—Stench-Traps	774
Lake, W. R.—Inflammable Gas	774
Walker, W. T.—Purifying Gas from Ammonia, &c.	774
Ball, T.—Treatment of Ammoniacal Liquor	774
Johnson, J. H.—Water-Meters	774
Ellis, W. I.—Forcing and Exhausting Air, &c.	774
Still and Lane—Illuminating Gas	775
Burrow, J.—Treating Sewage, &c.	775
Scott, H. Y. D.—Treatment of Refuse Lime	775
Kromschroeder, J. F. G.—Generating Inflammable Gas	775
Applications for Letters Patent	775
Grants of Provisional Protection	775
Inventions protected for Six Months	775
Notices to Proceed	775
Patents which have become void	776
Price Current	776
Share List of Metropolitan Gas Companies	776

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 10, 1872.

DEATH OF T. G. BARLOW, ESQ., C.E.

It is with the extremest regret that we announce the death, at Folkestone, on Friday last, the 6th inst., in his 61st year, of Mr. Thomas Greaves Barlow, the originator, proprietor, and editor of this JOURNAL. Mr. Barlow had been in failing health for some time past, but his death was somewhat sudden and unexpected.

We hesitate at this moment to speak of the eminent services Mr. Barlow has rendered to gas companies by his energetic and courageous defence of their rights and interests. They are well known to the readers of the JOURNAL OF GAS LIGHTING, and we are happy to believe have been fully appreciated. To-day we content ourselves with the bare announcement of a loss which we are certain will be felt by the whole gas community.

Notes upon Passing Events.

The residents of the metropolis—where big questions eat up the little ones, and the conventional nine days wonder may be reduced by at least one-half—can have no idea of the agitation which has been produced in the manufacturing towns by the application of the new Licensing Bill. It is fortunate for borough members that a general election is not likely to take place this year. Never was the great drinking interest more enraged, more united, more active in agitating against restrictions which touch their pockets in so sensible a manner. In a recent railway journey, extending over five days, we made a point of buying all the local newspapers. In all was to be found, under the usual "names of the pen," a series of furious correspondents—"Ajax," "Ulysses," "A True-born Englishman," "Anti-Tyrant," "Cato," &c.—all furious because "an honest working man" (the customers of public-houses are always honest in the tap-tub organs) could not enjoy conversation and drink until midnight, or get "something short" before six o'clock in the morning. Magna Charta was, of course, repeatedly invoked, and every stock phrase connected with despotism profusely employed. It must be admitted that, considering the great and unexpected political strength displayed by the public-house interest on the occasion of Mr. Bruce's first unfortunate Bill, it is extremely mortifying to find that an Act has passed through Parliament which really does arm the magistrates with power to limit the hours and opportunities for intoxication. The publicans feel that the power which now will not permit a house to be open before six o'clock, and compels it to close at eleven o'clock, may, under the pressure of public opinion, change those hours to seven in the morning and ten at night. Now shortened hours mean diminished profits, and there is nothing so serious as touching the pocket of any tradesman. For the first time an Act has been passed which creates a code stronger than the organized resistance of the publicans. They hold their licences during good behaviour; formerly it needed a gross case, and a very tenacious prosecutor, to deprive a public-house of its profitable privileges, even when a regular resort of thieves or "welshers." In the attempt to establish a platform of grievances, to be pressed on the House of Commons by members of Parliament who happen to be also barristers, the drinking interest keeps out of sight the fact that there are many liquids much more wholesome as a morning draught than rum, gin, or beer. That wherever a morning public is closed, an early coffee-house will be opened. That in populous towns like Nottingham (one of the loudest complainants) it is perfectly easy for working men to form one or more clubs where they may enjoy society and obtain beer as late as their wives will allow. It will not be the least advantage of the Licensing Act if incidentally it promotes the formation of real workmen's clubs, where they may enjoy conversation, read the newspapers with or without a pipe, and a glass of genuine beer direct from the brewers.

The Speaker—a worthy country gentleman—has been creating a sensation at very little expense. The agricultural labour question is the difficult question of the hour. The Speaker proposes to solve it, as far as he himself is concerned, by taking all his labourers into partnership. He offers to take from each his savings

from £5 upwards, to allow the same interest as the Post-Office Savings Bank—viz., 2½ per cent.—and further to give each at the end of the year a proportionate share of the profits of his farm. If the farm makes 10 per cent., they are to have 10 per cent. in addition to 2½. This is a very benevolent idea as far as it goes, but that is a very little way. It is in reality not a commercial transaction, but a new form of charity. To carry such a scheme into execution several conditions are essential. In the first place, the farmer must have the confidence of his labourers; secondly, they must be men he expects to employ permanently; thirdly, he must keep a very accurate system of accounts. Suppose the Speaker employs fifty labourers—and it is an outside calculation. He takes charge, say, of £250. He becomes answerable for interest amounting to £6 10s. Mr. Brand's steward will then have to open a ledger account for each labourer, for it is not to be expected that some of them will not require advances from the farmer-banker; some will die; some be dismissed, and others discharge themselves. Then comes the question of profits—a very nice one to decide—of no manner of consequence to the Speaker, because it could always be settled by an extra payment of £25 on £250, but in the case of an ordinary farmer occupying a few hundred acres of land, making profits one, two, or three years in succession, and then making a loss for two years, the scheme would never work. The average labourer, who had saved money, would not trust it to the average farmer. He would prefer putting it where he could get it when required. The average farmer cannot afford either the time or the cost of keeping the accurate accounts required where a partnership exists. In fact, Mr. Brande's plan is like the fancy cottages wealthy landlords erect to lodge the labourers and adorn their estates—pretty, but not a commercial transaction. The co-operative principle is a valuable one, which ought to be extended as regards most articles of consumption amongst the trading classes—and there are trades and manufactures in which it may be usefully adopted—but the example of this year's failure of the potato crop, or of the three dry seasons, when the light-land farmers of Norfolk lost all their crops, and with their crops all the capital expended in seed, artificial manures, and labour, prove that the co-operative system cannot be carried on between a farmer with capital and labourers with none. All the skill, zeal, and industry of the labourer will not secure a fine season. Now the farmer's profits are dependent on seasons.

By degrees it seems as if this would really become an educated country. The triumphant rule of thumb is disappearing from all professions. Soldiering has become a serious business, which was only the other day the amusement of the idle hours of the well-born or well-endowed curled darlings, assisted by dry mechanical drill sergeants. Under the new system, every aspirant to military rank must work at books as if he were going in for University honours, and know his drill as well as an adjutant. To this has been added, to the confusion of staff officers of the old school, autumn manœuvres, fixed just in the month for partridge shooting and the St. Leger. The turn of the navy, which was formerly the learned service by excellence, came next, when the niceties of steam were added to the art of navigation by sails, and when it was decided that captains and lieutenants must be responsible for steering the ships under their command. In a word, the modern ship of war is so complicated a collection of machinery, that every naval officer, to do his duty, must be a mechanic practically and theoretically, not only as regards navigation, but gunnery and naval architecture.

In this state of affairs, the idea of concentrating the feeble attempts hitherto made at scientific instruction in the little college of thirty pupils at Portsmouth, and the little school of naval architecture at South Kensington, enlarged into a great college devoted to all the arts and sciences connected with navigation and naval construction at Greenwich, is excellent. There is no reason to doubt that it will be thoroughly carried out. Then, for the first time, in a noble and conspicuous building, we shall have a college devoted to practical science, from which civilians will indirectly derive as much advantage as naval officers. In all times seafaring men have been remarkable for the versatile application of their abilities. They have succeeded as civil engineers, architects, gardeners, governors of colonies, and many other constructive and productive pursuits. This Greenwich Naval College will fit its pupils and its graduates for manifold employments beyond the military service of their country. Hitherto the rare attempts at scientific instruction have been housed in holes and corners, and limited to the few. Greenwich College will make the first notable exception, and enlist on its side a numerous influential profession. Of course, Sir James Elphinstone and men of his class detest the Greenwich College. Sir James has many reasons for his aversion. His Portsmouth constituents do not wish to lose the naval college, insignificant although it be. Forty years ago, when he was skipper of an East Indiaman—the service that enables him to be oracular on naval affairs—there was no science that could not be learned abcard ship; and, looking back with regret to those days, the plan of Greenwich College is as abhorrent to him as to that pattern of Turf morality, Admiral Rous; besides, he deeply regrets the change that sent the old salts to their friends on comfortable pensions, released them from a ridiculous costume, with all the petty restrictions and annoyances of a life partly military and partly monastic. Finally, Sir James Elphinstone and his friends personify the genuine opposition which objects to everything, proposes nothing, and honestly believes that all who differ from them are rascals. We shall not be surprised to find that the new Chancellor of the Duchy of Lancaster devotes part of his leisure to the question of naval collegiate education.

A mania seems to possess a certain class of politicians for adding to the work of Government, and increasing the taxation of the country, by schemes for making undertakings official which have hitherto been left to private enterprise. Mr. Tom Taylor, who, in virtue of his literary success and liberal politics, has long enjoyed a sort of semi-sinecure connected with the old Board of Health, published, not long since, a pamphlet advocating the creation of a national theatre, where a model manager, with model actors and actresses, were to act model dramas for the improvement of British taste. The idea fell—stillborn. We must have quite a new class of Chancellors of the Exchequer of any party before the House of Commons votes money to set up an opposition to existing theatres. The project did not even show as much life as Mr. Henry Cole's laid, but unhatched egg, for making that terrible financial failure, Albert Hall, the site of a national academy of music. Next we find, in a Liberal and philosophical daily paper, a suggestion that Government should undertake to amuse the metropolitan public in an establishment as big as the Crystal Palace, but conducted on more æsthetic principles—that is to say, no acrobats, no punch and judy, no light fantastic music, and a great deal of art and science. We really expect that these æsthetical gentlemen or ladies will some day propose that, in the interest of art, the Government shall undertake to find us all in milliners and dressmakers, so as to attire our wives and daughters in better taste—which would not be difficult as far as women's heads go—and at less expense.

The last proposal, supported with extraordinary unanimity in the large type correspondence of all the daily papers, was that Government should undertake to improve the breed, and increase the number of our horses. The first suggestion, made with marvellous unanimity, was floated in the way of a pathetic regret when the celebrated stud farm of Mr. Blenkiron was sold and dispersed. Writers in journals, ordinarily supposed to be regulated by principles of political economy, bewailed the condition of the country when no minister was bold enough to buy in one lot the sires and brood mares of an establishment carried on exclusively for breeding racehorses. Considering that the modern racehorse is bred chiefly to gallop three-quarters of a mile with a boy on his back, that Mr. Blenkiron's stud was anything but successful in producing winners of great races, and that at the present moment there are more racehorses in existence than at any time in the history of the country, the *cui bono* of the proposal of the official correspondents of *The Times*, *Daily News*, *Telegraph*, and *Standard* was not very evident. Lately a note of alarm has been sounded in consequence of the scarcity of the type of horse fit for cavalry. Government is asked to forbid the exportation of mares, to set up national breeding, to offer all sorts of prizes—in a word, to adopt the devices and restrictions which have been practised in France for the last two hundred years, with all sorts of modifications, and which were all abolished by the late Emperor of the French, with the exception of stallion depôts. We refer to this question because it affords one of the best illustrations of the mania which possesses certain philosophical Radicals for multiplying State interference with private enterprise. The English horse is the best in the world; that is proved by the fact that all civilized nations purchase largely in order to improve their native breeds. This horse has been created within 250 years by private enterprise alone, without any interference or assistance from the State, except a few racing prizes of insignificant importance. The various breeds have been brought up to a standard merit which Europe has acknowledged for more than a hundred years by the taste, skill, and enterprise of country gentlemen and farmers, stimulated by constant demand. Has the demand fallen off? By no means; prices are higher for good horses of every kind than in the midst of our great wars. Is there any want of capital in the horse-breeding counties? On the contrary, the taste for horses leads hundreds to breed without any distinct idea of profit. Have Government establishments shown any success in horse-breeding? On the contrary, the Hampton Court stud is considered one of the poorest in the country. Thus we have ample grounds for concluding that the advocates of official horse-breeding propose to set up the Government—which has neither created the blood horse, nor shown any skill in breeding him—as a competitor with Government funds

against all the country gentlemen and farmers who now breed for pleasure or profit. A Government stud, if it is to pay its expenses, must discourage private breeding studs; a Government stallion travelling at nominal fees will put down the Yorkshire farmer who owns and travels one as a way of living. It is not likely that our members, Liberal or Tory, will propose, or our Parliament will sanction, the introduction of costly schemes for horse-breeding, which European nations adopt because they have neither the country gentlemen nor the farmers that England has; but the question is worth attention, because every day some new attempt is made to substitute rigid ignorant officialism for the elasticity of private enterprise.

The present harvest will be remarkable in the memory of farmers as the season when the last vestiges of prejudice against the employment of machinery were destroyed; when the most thickheaded—and they were many in certain counties—were compelled to hire or purchase reaping and threshing machines. It is just 21 years since the reaping-machine was brought prominently before the agricultural public at the Hyde Park International Exhibition. It was an American invention, and required many modifications before it became fitted to cut the heavy crops of this country. As usual, in agricultural machinery, it was first adopted by great landowners and the cream of tenant-farmers. It had many defects, and was not always economical in money cost, although a more rapid performer than any possible number of reapers or scythemen. Twenty years have done wonderful things in improving the reaping-machine by the competition of half-a-dozen patentees, and at the same time extending its use; but a great leap in advance of its use is due to the agricultural strike of 1872. We hear of one parish where six of the previously unused mechanical reapers arrived the same day. Yet such is the demand for labour that the cost of finding and carrying the crops was just double that of last year. The machine reaper naturally entails the use of the steel horse rake, which leaves very little for the gleaners, and the present cost of ploughmen stimulates the use of the double-furrow plough—an old idea recently worked out and made popular—and where the soil and situation suit the steam cultivator, which is not a plough at all. In a word, the agricultural implement makers are all doing as much work as nine hours will allow. Unfortunately for the publicans of Leeds, Lincoln, Grantham, and Ipswich, their hours have been limited when their customers were most flush of money, with an extra hour to spare on their hands.

M. Thiers, the hero of the hour—

The old man eloquent—

who has forgotten nothing and learned nothing in his sixty years of active life, is only consistent in his frantic efforts to undo all the Emperor's treaties of commerce created. When minister to Louis Philippe, he went over some linseed mills near Dieppe, in which that astute monarch had a share. He asked where the linseed cake was consumed? "Exported to England," was the answer of the man, who told us the story. A few months afterwards a duty was laid on the exportation of linseed cake, and the flax-grower was compensated (?) by a duty on imported linseed.

Circular to Gas Companies.

The Board of Trade have appointed as the new metropolitan gas referees Professor Tyndall, William Pole, Esq., C.E., and Vernon Harcourt, Esq. The scientific character of the new Board is guaranteed by the nomination of three Fellows of the Royal Society; but it is not to be expected that its constitution will satisfy every one. We said some time ago that, considering the questions which the referees have to decide, the Board should consist of a physicist, a chemist, and, as the law requires, a practical gas manufacturer. On all photometrical questions Dr. Tyndall is eminently qualified to express an authoritative opinion. Mr. Vernon Harcourt is known to have devoted a good deal of study to the removal of sulphur from gas, and Mr. Pole, as a professional engineer, and in the capacity of referee, has been much engaged on gas matters. It is understood that the salaries of these gentlemen are to be £200 per annum, with a modest allowance for office expenses. For the future the chemicals required for the testing-stations will not be supplied by the referees, it being conceded that the cost of these properly falls on the local authorities. The first step taken by the new referees is to a certain extent a reactionary one. They have fixed the sulphur maximum for Bow and Beckton from the 1st of October next at 20 grains, the limit we suggested, in place of 15 grains, as decided upon by the late referees who have just retired from office. This limit we believe to be reasonable, and will leave the company no excuse for exceeding it, unless "from unavoidable cause or accident." We need not anticipate the questions which will soon be forced upon the attention of the new referees, but may stop to point out that they would render great service to the gas companies and the public if they could devise means whereby lime could be freely used in all works without occasioning a nuisance.

It was hardly to be expected that the letters of the engineers of the Chartered Company appended to the last report of the late referees on sulphur purification at Beckton and Bow, and printed in our number for July 30, would be allowed to pass without notice, and to-day we publish a "Supplement to the Referees' Report on the Sulphur Purification at Beckton," which is, in fact, a reply to the letters in question. In this reply the late referees insist upon the novelty and originality of their mode of working lime purifiers. What they may fairly claim is, perhaps, to have explained and reduced to a system the purification of gas from sulphur in other forms than sulphuretted hydrogen. It may, we think, be reasonably assumed that, when some years ago the gas made at Bow exhibited, as regarded sulphur impurity, such a remarkable contrast to that made in any other London works, Mr. Harris was using lime substantially in the way recommended by the referees, but by rule of thumb, without knowing the rationale of the process, and unable to avoid the fluctuations over which he has now perfect control. That he was cognizant of the action of sulphide of calcium may be guessed from the abortive experiment with soda waste, and it is unfortunate for him that in his correspondence and conversations with the referees he never seems to have named the compound. It may be granted, too, we believe, that Mr. Harris was aware of the nullifying action of carbonic acid, although the experiments proving it are not forthcoming, and the referees assert that he never tested his purifiers for carbonic acid, which is essential in carrying out the system recommended by the late referees. As was said here several months ago, an attentive study of the mode of purification at Bow would probably lead to a solution of the sulphur question, and we find here that the first recommendation made by the referees for the improvement of the purification at Beckton, was to adopt the same plan as was pursued at Bow. It was simply to use lime before oxide, but to be successful in this required experience, which the Beckton engineers did not possess, and, therefore, though at one time nothing but lime was used, no good result followed. The reason can easily be guessed. We make no remarks on the part of this report specially applying to Beckton. It may be expected that the controversy will not end here, for there are evidently some matters which require explanation, and we understand that an answer is already in preparation.

Mr. Flintoff opened a campaign against the London gas companies by a meeting on Tuesday evening last, under the auspices of the London Gas Consumers Association, whose members, he said, represented the consumers of half the gas used in the metropolis, and who intend next session to go to Parliament with a Bill "to annihilate the present system of gas manufacture and "supply, which has become a mockery, a delusion, and a snare." The remedies for the present state of things he appears to suggest are the purchase of the gas companies by the Metropolitan Board and Corporation of London, and the adoption of the Eveleigh system of manufacture. The latter, he said, would produce 20-candle gas cheaper than 12-candle gas is made by the present system. But he evidently thinks 20-candle gas much richer than is necessary, for he said the agitation would be continued until every workman could have gaslight equal to 8 or 10 candles in his house every night for four hours per night, at a cost of 3d. a week. It would serve no useful purpose here to follow Mr. Flintoff through all his wild statements and misrepresentations. He will find hearers, no doubt, wherever he goes; and if subscriptions to the London Gas Consumers Association flow in, probably his object will be fully attained.

The second part of the communication of Dr. Macadam to the North British Association of Gas Managers, which we publish to-day, is of great value, and will be read with much interest. It points to the possibility of a great change in the future of gas-making, and suggests, now that cannel is getting extravagantly dear, the erection of small subsidiary works for the production of gas from crude paraffin oil. According to Dr. Macadam, one ton of this oil, costing £4 4s., when allowed to trickle slowly over coke raised to a white heat, will yield 46,000 feet of sufficiently permanent gas having the illuminating power of 25 candles, at a cost of 1s. 4d. per 1000 feet for raw material. The cost of plant and manufacture will be comparatively small, and little or no purification will be required. It is evident that the price of raw material given above could not be calculated upon for long if the oil should come into use for gas-making; but a considerable addition might be made, and still leave the materials free to compete with cannel at prospective prices. We confess to some astonishment at the permanency of the illuminating power of the gas, not expecting that such a complete break-up of the oil would take place in the retorts, and we should have been glad if Dr. Macadam had given an analysis of the gaseous products. Perhaps he will furnish us

with this, and the specific gravity of the gas also, at a future time. In the meantime we have to thank him for a most valuable communication.

The Ryde people are in dismay at the last result of their anxiety to get possession of the gas undertaking—namely, the seizure of the furniture and pictures at the town-hall for the satisfaction of Mr. Stevenson's account. The moral of these proceedings at Ryde may be quoted from Tam O'Shanter, and we may say to Corporations, "If the desire to acquire gas undertakings runs in "your mind,

"'Think, ye may buy your joys o'er dear.'

"Remember Ryde."

We see, in a weekly contemporary, the *naïve* suggestion, by an able editor, that Corporations should never resort to arbitration, since the result of such proceedings always depends on the caprice of the umpire, but should, in all cases, rely on the judgment of one eminent engineer. There are, however, two parties to a bargain, and what would happen if the gas company did not accept the estimate of the Corporation valuer? This the able editor does not inform us.

It seems that we were in error when we said in our last that no report of the meeting of the Patent Gas Company had been published. Our attention has been called to one in the *Investors' Guardian*, which confirms our suspicions that the manufacture of Patent Gas at East Barnet is carried on at a loss—"slight loss," according to the chairman, and owing to the enhanced price of coals; "but with reference to the working of the patent at East "Barnet he hoped his word would be taken without the necessity "for further explanation." We have, therefore, to content ourselves with the bare admission that the manufacture at East Barnet is not profitable. It may appear extraordinary that the shares in a company which had just declared a dividend of 20 per cent., and the shareholders in which had been assured that a similar dividend could be paid for four years to come, should rapidly fall below par, but such was the fact. Surely we were right when we said that the affairs of the Patent Gas Company are shrouded in mystery.

Our list of advances in the price of gas is to-day rather long. First of all we must mention the Corporation of Manchester, who are always quoted as models of gas managers. They have raised the price 2d. per 1000 feet, an advance which no doubt Sir J. Heron can easily justify. Next we have Durham and Sunderland. In the former city the price of coal has risen within the past twelve months from 5s. to 16s. per ton, that is, more than 200 per cent., and yet an indignation meeting has been held to protest against a rise of 20 per cent. in the price of gas, and here, too, the Corporation are recommended to supply gas so that the "handsome" profits may be applied to the reduction of rates. At Sunderland we are told that the price of coal is 1500 per cent. higher than it was 20 years ago, which sufficiently shows the absurdity of fixing a maximum price. At Barnsley the gas company content themselves with raising the price of coke. At Stockport the Town Council have given notice of an advance to the extent of 1s. per 1000. At Kimbolton the company have raised the price to 7s. 6d. per 1000. At Church Stretton, at a meeting of consumers convened by the gas company, it was unanimously agreed to submit to an increased price of 1s. per 1000 until December 13, at which date the company were to call another meeting. This case offers a good example to small country companies. In Peterborough the price has been raised 6d. to private consumers, with a corresponding increase for public lights. At Louth the price has been raised 10d. per 1000 feet; at Wolverhampton and at Brynmaur, 5d.; and at Stoke-upon-Trent the gas company have given notice to the Improvement Commissioners that an advance will be made in the charge for public lamps. At Hedon, 10s. per lamp has been added for the ensuing year. At Petworth the price has been raised 8d. per 1000 feet. At Darlington, after some discussion, the Town Council resolved not to raise the price of gas at present. At Salisbury the gas company have displayed great liberality. They have made no addition to price, and they have supplied the gas for the recent illuminations gratuitously. The Cowes Company have also determined not to make an advance, believing that the increased cost of coal will not be maintained. From Clitheroe it is reported that the Corporation, rather than pay 5s. per 1000, have agreed to let the streets remain in darkness during the forthcoming winter. The Town Council are, of course, authorized to borrow money on the rates, and construct new works! A more sensible resolution has been come to at Burslem. There the Local Board, after notice of an advance in price from the company, appointed a committee to make an arrangement with the directors.

In Scotland corresponding advances have been made. The Corporation of Kilmarnock have raised the price 10d. per 1000 feet, and have abolished all discounts. The Finance and Gas Committee of Rothesay have agreed to raise the price 1s. 3d. per 1000 feet. At Inverary the price has been advanced from 10s. 10d. to 13s. 4d. (!) and a local paper remarks that "a feeling "prevails among the poorer class of consumers in favour of "stopping their supply for the present, and burning paraffin." At Peebles also an advance of 2s. 6d. per 1000 feet has been made. The above are all cannel gas supplies, and the advance is sufficiently indicative of the increased cost of cannel in Scotland. At Girvan the price has been raised 10d. per 1000 feet.

Miscellaneous News.

RATCLIFF GASLIGHT AND COKE COMPANY.

A Half-Yearly General Meeting of this Company was held at the Offices, 345, Cable Street, E., on the 30th ult.—A. WILSON, Esq., in the chair.

The report and statement of accounts were as follow:—

The directors have much pleasure in submitting their report and accounts for the half year ended June 30, 1872.

The accounts show a net profit of £6461 10s. 10d., out of which the directors recommend that a dividend upon the paid-up capital of the company, after the rate of £5 per cent. for the half year ended June 30, 1872 (less income-tax), be now declared, payable on and after the 4th day of October next.

Dr. *Trade Account, for the Six Months ended June 30, 1872.* *Cr.*

To Coals			£6,706 3 6	By Gas		£14,512 19 8
Purifying materials			62 11 0	Public lighting		1,937 5 3
Salaries of engineer and clerk at works			330 0 0	Rental of meters		83 13 9
Wages			1,834 3 1	Coke £2,753 10 9		
Repairs & maint. of works & plant, & labour £1223 14 6				Less breeze 3 2 8		2,750 8 1
Less old matrl. sold 59 0 11				Tar		183 12 9
			1,164 13 7	Liquor		686 18 7
Salaries of inspectors and clerks in office			328 8 0	Rents		126 1-9
Repairs and maintenance, distribution, and labour			493 9 8	Miscellaneous receipts		109 11 7
Repairing and renewing meters			231 7 0			
Lighting and repairing public lamps			332 18 0			
Rents			130 2 1			
Rates and taxes			549 13 3			
Directors allowances			400 0 0			
Salaries of secretary, accountant, &c.			335 17 6			
Collector's commission			208 2 0			
Stationery and printing			46 5 2			
General establishment charges			90 3 7			
Auditors			15 15 0			
Law charges			14 8 4			
Depreciation-fund (leaseholds)			110 0 0			
Bad debts			144 6 11			
Interests on borrowed capital			391 15 0			
Balance or net profit			6,461 10 10			
			£20,381 13 6			£20,381 13 6

The CHAIRMAN, in moving the adoption of the report, said: I can again congratulate you on the very satisfactory nature of the work for the last half year. You are aware when I last addressed you I told you we had reduced the price of gas to 3s. 9d., and now, after six months working at the reduced rate, and with proper supervision, we are able to give you 10 per cent. and carry something forward to the next account. There is, however, something to mar our satisfaction, for we have had a very large rise in the price of coal, so that I do not know what we may have to say for the future; but I do not want you to go away with a gloomy face, because things may turn out far better than we anticipate. We have, however, had to give very much more for our coal this year than we did last. That is a very large item, but it is counterbalanced a little because we get an increased price for our liquor and for our tar, and should probably get more for our coke. For all that we cannot look forward to making up the deficiency. We have also got the labour question to deal with. All the men of the gas companies are asking for an increase in their pay of something like 5 per cent. That militates much against us at this time of the year, because if coals were anything like a proper price we might increase the wages with a great deal of grace, and at the same time with very great satisfaction to ourselves; but when we have all these things against us it comes very hard indeed upon your directors, who have carefully to look forward, and it will only be by strict economy and downright hard and strong perseverance on the part of the officers of the society that we shall be able to give you, next half year, something like that which we have given you now. I have nothing more to say, only that we have added a little to our capital account. We have purchased a plot of ground in Ship Street, with a house upon it, which stood in the way of our works. We have acquired the land for something like £500. Do not go away with the impression that you are not to receive any dividend next half year, for I do hope we shall be able to give you as good a dividend as this half, but you see the position we are in, coals having risen so much in price.

In reply to questions by Mr. GARNAR,

The CHAIRMAN said it was impossible to tell what would be the advance in the price of coke.

Mr. NUTTER: Railway and other companies are contemplating raising their rates. We have hitherto been reducing ours. Cannot we raise the price of gas under the exceptional circumstances of the rise in coal and wages?

The CHAIRMAN: Unfortunately we have only just reduced it, and it would not look well to raise it threepence now, but the directors are perfectly alive to this, and next half year, if necessary, they will raise the price.

Mr. BROMLEY (deputy-chairman) seconded the motion, and the report was unanimously adopted.

The CHAIRMAN proposed, and Mr. H. BADDELEY seconded, the declaration of a dividend upon the paid-up capital of the company after the rate of 5 per cent. for the half year, less income-tax, to be payable on and after the 4th of October. This was agreed to.

Mr. NUTTER proposed a vote of thanks to the chairman and directors, which was seconded by Mr. Garnar, and agreed to.

The CHAIRMAN acknowledged the vote.

A vote of thanks was also accorded to the Secretary, to the engineer, and to the auditors. These votes were suitably acknowledged, and the meeting terminated.

NENAGH (IRELAND) GAS SUPPLY.—The principal inhabitants of Nenagh, and the railway company, have notified their intention of discontinuing the use of gas, and substituting oil lights, in consequence of the gas company having given notice of raising the price of gas to 10s. 10d. per 1000 feet, from the 1st of September.

LINCOLN WATER-WORKS PURCHASE.—The *Stamford Mercury* says: "We hear that the Bank of England have agreed to advance the money (£70,000) to the Lincoln Local Board of Health, required for the purchase of the water-works."

WOLVERHAMPTON GAS COMPANY.

The Half-Yearly Meeting of the Shareholders of this Company was held on Tuesday, Aug. 27, in the forenoon, at the Company's Offices, Queen Street. Mr. J. UNDERHILL (vice-chairman) presided, in the absence of the chairman (Mr. Cooper), who was precluded from attending by illness.

The directors half-yearly report and statement of accounts showed that the revenue for the six months ended June 29, 1872, was £17,914 2s. 5d., and the expenditure £12,532 13s. 2d. The directors recommended the payment of the usual dividend of 5 per cent. The extraordinary advance in the price of coal and other materials used in the manufacture of gas, together with labour, compelled the directors very reluctantly to announce an advance in the price of gas from 2s. 6d. to 2s. 9d. per 1000 feet, from and after the 1st of October next. During the past half year the usual alterations and repairs at both stations had been going forward, and the directors had every confidence that their plant was in such a good working state as to enable them to meet any demand that might arise. In conclusion, the directors assured the shareholders of their constant aim to promote the interests both of the proprietors and of the public at large.

The CHAIRMAN, in moving the adoption of the report and financial statement, remarked that the working of the company had been successful during the half year. The object of the directors had been not only to provide the dividend for the shareholders, but to manufacture the gas as good in quality and at as low a rate as possible, and as the result of their endeavours they had no hesitation in affirming that the quality of the gas of the Wolverhampton Company was as good, and the prices as cheap, as that of any other company in the kingdom. He need scarcely say how reluctantly the directors had found themselves compelled, in consequence of the extraordinary advance in the price of coals and labour, to take a step backwards, and to slightly advance the price of gas. In doing that the directors looked at the advance made by the other companies throughout England, and the rise of 3d., which they had determined upon, they found was the lowest declared by any other company. He need scarcely say that in the event of coal decreasing in price the directors would have pleasure in reducing the price of gas.

Mr. LLOYD seconded the adoption of the report, and it was accepted.

The CHAIRMAN then moved, Mr. SAVAGE seconded, and the meeting approved, that a dividend of 5 per cent. per annum should be declared, free of income-tax, and payable at the close of the meeting.

Upon the proposition of Mr. LLOYD and Mr. THOS. WARD, the chairman and the directors were thanked for their services, and confidence expressed in their future efforts. Mr. Lloyd also adverted to the illness of Mr. Cooper, their chairman, and regretted his absence from among them.

The CHAIRMAN responded on behalf of himself and the directors, and joined with Mr. Lloyd in his sympathy for the illness of Mr. Cooper. He was, however, able to state that that gentleman was now recovering, and had recently attended the meetings of the directors and various committee meetings.

BOLTON GAS SUPPLY.

LAST MEETING OF THE BOLTON GAS COMPANY.

On Wednesday, Aug. 28, the final General Ordinary Half-Yearly Meeting of the Shareholders of the Bolton Gas Company was held in the Board-Room, at the Gas Office, in Hotel Street, "for the purpose of declaring and ordering payment of the half-yearly dividend up to the 30th day of June last"—Mr. THOMAS MOSCROP in the chair.

The directors submitted the following report:—

The net expenditure on capital account has amounted to £2329 4s. 7d., chiefly for main-pipes to improve the supply of gas to outlying townships, and for hired meters required for the increasing demand for gas throughout the whole district.

In revenue account, the gas-rental again shows a very satisfactory increase. Although the advanced price of materials and labour has caused a greater expenditure, that, however, has been nearly counterbalanced by the increased profits on residuals and secondary products. The item of law and parliamentary expenses is large, consequent on the transfer of your undertaking to the corporation.

The result of the half year's transactions is to carry to the reserved fund the large sum of £2806 8s. 8d., which raises that fund to £18,260 0s. 1d., being within £508 14s. 11d. of the maximum allowed by the company's late Act of Parliament.

The dividend will be as follows:—

5	per cent. on £64,498 10 0	£3224	18 6
3½	„ 123,189 0 0	4003	12 10
	Total	£7228	11 4

The CHAIRMAN said: Gentlemen, before proceeding to our ordinary business, permit me to offer one or two explanatory remarks respecting our somewhat unique and peculiar position on the present occasion. As you have already been officially informed, the undertaking of the Bolton Gas Company became vested in the corporation on the 30th day of June last. The 50th section of the Act of Parliament, empowering the transfer, thus enacts: "As soon as conveniently may be after the vesting period, the gas company shall proceed to wind up their affairs, and the directors in office shall continue, without re-election, to hold the office of directors until the affairs of the company be wound up, and so soon as the gas company shall have wound up their affairs they shall be dissolved and cease to exist." It is therefore in pursuance of this enactment we now hold this our final general ordinary half-yearly meeting, for the purpose of submitting our last report and balance-sheet, and of declaring and ordering payment of the half-yearly dividend up to the 30th of June last. Of course, there will still be a few matters of detail to complete, a few accounts to verify and discharge, and the balance at the bank standing to the credit of the company will then be handed over to the corporation. On referring to the first item on the credit side of the revenue account, you will find the gas-rental is £25,760 14s. This amount exceeds that of the corresponding period of last year by £3734 13s. 1d., and represents the quantity of gas sold 151,731,000 cubic feet, as against 128,693,000 feet of the corresponding period of last year, being an increase of 23,038,000 feet, or 17·8 per cent. Rapid and continuous as has been the increase of gas-rental previously, this increase was so much larger that it occurred to me there might have been an error in taking the meters. On an analysis of the different classes of consumers, however, I find it is strictly accurate. It is the largest corresponding half year's increase in the history of the company. This highly satisfactory increase is attributable, I take it, not so much to an increase of consumers, as to the continued and increased activity of trade in all its several branches throughout the district; but more particularly so in certain branches of the cotton business. Happily for us, so far at least as this revenue account is concerned, we have not been affected by the exorbitant rise in the prices of cannel and coal—that is, I mean to say, the cost to us has been the same as in the corresponding period of last year. In point of fact, it has cost us in the aggregate less by £453, as a simple rule of proportion will show: Thus in June, 1871, as £9953 of cannel and coal is to £22,026 of gas-rental in June, 1872, so £11,436 is to £25,307; but the actual amount, as stated, is £25,760, *plus* £453. I may further add, parenthetically, happily also for our successors, we were so fortunate in our last contracts that for the next twelve months at least the advance to them will not exceed the sum of 2s. per ton. One of our present contractors for cannel told me the other day, that even since we made our last contract with them, which is only about three months ago, they had again advanced their price of cannel as much as 11s. 6d per ton. There is, however, just now, this compensating element in our behalf, as a kind of set-off for the general rise in labour and materials in general—viz., our residuals and secondary products, being considerably advanced in value, have told very favourably this half year. Of the former, coke, for instance, which was last year selling at 5s. per ton, is now selling at 15s.; of the latter, for instance, sulphate of ammonia not very long ago was only worth £11 2s. a ton, whereas it is now selling at £21 14s. Again, though our turn-over in meters and fittings has not been so large as in the corresponding period of last year, yet, owing to the advanced price of stock on hand, the profits are considerably larger. The proceeds from residuals are £2888 17s.; the profits on secondary products, £1053 19s. 7d.; and the profits on fittings, £843 4s. 6d., making a total from these items for the half year of £4786 1s. 1d. On the debit side, one or two of the items are again unusually heavy. Repairs of iron and brickwork are £2517 12s. 5d., and law and parliamentary, £1517 7s. 4d. This is owing to the proceedings incidental to the transfer; were it not for that, and had we retained possession of our works, the legitimate inference is, in accordance with the 31st section of the Gas-Works Clauses Act, that to-day it would have been our pleasing duty to announce a reduction in the price of gas, inasmuch as we should have exceeded the maximum amount of reserved fund allowed by our late Act of Parliament. Forecasting, however, all their liabilities and adverse circumstances with which, it is to be feared, we should ere long have had to grapple, the possibility is it might have again to be raised to its present price. I think I have now touched upon most of the more salient points in revenue account. There is this noteworthy fact. We have now, for the first time, paid a full six months dividend on the whole of the share capital. As the result of our six months transactions we show a gross profit of £10,035, and it is thus disposed of: Dividends, £7228 11s. 4d.; transferred to reserve-fund account, £2806 8s. 8d., which now stands at £18,260 0s. 1d., being within £508 14s. 11d. of the maximum allowed by the company's late Act of Parliament. Gentlemen, I deem it a cause for congratulation, and I will not disguise from you the pleasure and thankfulness I experience, in the conviction that in parting with our works we do so under circumstances that so amply justify us in the soundness of the policy we at the first adopted, and for the successful carrying out of which we have cheerfully devoted time and thought, and no little anxiety, without stint or grudging. It is now just seven years ago since I was placed by my colleagues in my present position, when some of you may remember I made bold to say that it would be the constant aim of the directors to be open and above-board, to act an honest and straightforward course, and to pursue a policy which should have a decided reference to the interests of the gas consumers, and that by a vigilant supervision, a persistent application of an intelligent, skilful, energetic—not a narrow and parsimonious, but a wisely economical management—the Bolton Gas-Works would be, could not but be, a successful undertaking, adding at the same time I would prescribe no other formula, nor endorse any other policy. And in these utterances I knew I was only speaking the sentiments also of every member of the board. The task assigned us is now accomplished, and our work is finished. As an indication of the operations and results of the Bolton Gas-Works during those seven years, I give you the following facts. There may be other instances where gas companies have been enabled to exhibit results as favourable. In all candour I have not heard of one such. The capital expended at the end of June, 1865, was £110,421; at the end of June, 1872, it was £190,176, being an increase of £79,755, or 72 per cent. The amount of capital expended for each £100 of gas-rental in 1865 was £420; and in 1872, £367. The sale of gas in the year ending June, 1865, was 145,849,000 cubic feet, and in the year ending June, 1872, 304,585,000 cubic feet, being an increase of 158,736,000 cubic feet, or 108 per cent. The gas-rental in the year ending June, 1865, was £26,235, and in 1872, £51,725, being an increase of £25,490, or 97 per cent. In the June quarter, 1865, the price of gas was reduced 2d. per 1000 cubic feet. Had the price remained in 1872 the same as in 1865, the increase would have been £28,028, or 106 per cent. Meanwhile, the shareholders have not, in a single instance, failed receiving their honest and well-earned maximum dividends. If it be true—and I grant it is true—the shareholders have received a very good price for their property, it is not the less true that the corporation have got a prosperous concern as their purchase. They have got value for their money, and I sincerely trust the transfer will eventually prove satisfactory and advantageous to the shareholders, the corporation, and though last, not least, the gas-consuming public. The chairman concluded by moving the adoption of the report and balance-sheet.

Mr. GEORGE SLATER seconded the motion, and it was carried unanimously.

The CHAIRMAN next moved the usual resolution—"That a dividend be declared of £10 per cent. per annum on the old shares, and of £6 10s. per cent. per annum on the new shares, and that the same be paid forthwith, free of income-tax."

Alderman GREEN seconded the motion, which was carried unanimously.

Mr. JOSEPH BROOKS moved a vote of thanks to the chairman and directors for their invaluable services. He had had such pleasure in meeting them every half year that he almost regretted these sort of meetings were over. He had only just begun to find out that private enterprise, such as that with which the affairs of the Bolton Gas Company had been conducted, was the best, for he was not aware of that fact until he became a shareholder. As gas consumers, he hoped they would still reap a benefit from the works, though he could not think that in the future they would derive the same benefit as in the past. Should they do so, it would be very satisfactory to all the consumers, but they must remember that the advance in the price of labour and material would have an influence in an opposite direction. However, he hoped the price of gas would be kept as low as it was at present.

Mr. JAMES LOMAX, in seconding the motion, said he believed the directors and the chairman had performed their part manfully, and that they had conducted the business of the company in a manner not only creditable to themselves, but advantageous to the shareholders. He did not know of any other company in the world that had done better. There had been some statements floating about outside that certain things had not been done so well as they might have been, and that a saving of a large amount might have been effected in the removal or abolition of certain officers. Now, whatever that saving might have been, supposing these things to be true, which he did not credit, he thought the report just made by the chairman was of such a character as to entirely dispose of such rumours. The whole of the report was exceedingly satisfactory, and it would be ungrateful on the part of the shareholders not to give the chairman and directors a hearty vote of thanks. He should like that to be done in a more substantial form than in the mere passing of a formal vote of thanks. When they raised that building they "warmed" it, and he would like to send the directors and the chairman home with a warm heart.

Mr. J. WATKINS, law-clerk, desired to support the motion. He had seen a good deal of the present chairman for the last seven years. It had been his pleasure to have worked, not only under Mr. Moscrop, but also under two previous chairmen, Mr. John Slater and Mr. Johnson Lomax, and he could fully bear out everything that had been said with reference to the present chairman's undivided attention, assiduity, cleverness, and knowledge in connexion with the works. He felt satisfied that the successful issue of this negotiation and sale was due mainly to the energies of Mr. Moscrop. If it had not been that they had had so efficient a chairman, he (Mr. Watkins) doubted very much whether the works would have attained that prosperity which now marked them; therefore he very cordially supported the motion.

Councillor E. G. HARWOOD also supported the motion, expressing the hope that the gas undertaking would be as prosperous under the corporation as in the hands of the gas company.

The motion was carried unanimously.

The CHAIRMAN said he felt very grateful for this recognition of his humble services. He thanked them very sincerely for the courtesy they had extended to, and the confidence they had reposed in, himself and in the board. They had simply endeavoured to discharge their duty.

This concluded the business.

GLASGOW CORPORATION GAS-WORKS.

The following is the Report by the Committee of the Corporation on Gas Supply, which has been issued to members of council, and was presented at the last meeting of the Town Council:—

Finance.—The committee beg to submit to the Town Council the balance-sheets for the twelve months ending the 30th of June, 1872, being the third year in which the gas supply has been in the hands of the corporation. The profits on the revenue or working account amount to £57,768 4s. 10d., as compared with £68,203 4s. 4d. of the previous year; and when the reduction made last year in the price of gas to the public is taken into account—a reduction amounting to nearly £10,000—and also the great increase in the price of coals and labour, this result must be considered satisfactory. It will be observed, besides, that during the past year larger sums than usual have been expended out of revenue in the maintenance and renewal of works and plant, and in repairing and renewing meters. After writing off £8084 8s. 10d. to capital for depreciation, being at the rate of 1 per cent. on works and pipes and 3 per cent. on meters, there remains to be carried to profit and loss account—

		£49,683	16 0
to which add balance from previous year		11,722	19 3
		£61,406	15 3
Out of this have been paid the annuities on stock and the interest on borrowed capital, amounting to	£44,221 7 4		
and provision made for a sinking-fund of . .	3,453 5 0		
		47,674	12 4

leaving to be carried forward to next year's account a balance of £13,732 2 11

The corporation's Gas Act of 1869 contains the following clause (section 83) relating to the formation of a sinking-fund:—"The corporation shall, after the expiration of two years from the passing of this Act, set apart as a sinking fund a sum not less than 1 per centum per annum on the amount borrowed under this Act, which sinking-fund shall from time to time be invested in Government securities, and shall, with the accumulations thereof, be, together with the interest on the several amounts paid off, applied by the corporation to the redemption of mortgages or annuities, and not otherwise; provided that the said sinking fund shall not be less than £2000 in any one year." The time having arrived when provision for this fund has become necessary, a sum equal to 1 per cent. on borrowed capital has been set aside under the head of "Sinking-fund," which will be invested in Government securities, as required by the Act. The properties at Calton, Cowcaddens, and Weaver Street, with the ground annual over subjects in Lancefield Street, included in last year's capital account, have since been sold by public auction, realizing a profit of £1440 14s. 2d., which, it will be observed, has been written off in reduction of Townhead works. The additional capital borrowed during the past year amounts to £162,725, which makes the total addition to the mortgage debt since the works were acquired by the corporation, £226,060. The consumption of gas has increased nearly 10 per cent. over the preceding year, being—For 1871, 1,116,612,000 cubic feet; for 1872, 1,227,229,000 cubic feet.

Works.—As the council is aware, contracts were entered into early in the year for the new works which are now being erected on the lands acquired by the corporation at Dawsholm, near Maryhill. It was expected that a portion of these works would have been ready for use by next winter. The unfavourable weather and scarcity of labour will prevent this, but they will certainly be in operation early next year. The mains from these works to town have been laid and connected to the leading mains from the other works. At Dalmarnock Gas-Works new condensers and purifiers are being constructed, and every effort is being made to have them completed before winter. When this is done these works will be capable of producing 5,000,000 cubic feet of gas per day. The additions and improvements which have been gradually carried out at Tradeston station are now all but completed. These works, which have been almost entirely reconstructed during the last two years, are now in a state of efficiency, and their power of production has been doubled. Townhead and Partick stations have been merely kept in repair. The committee were fortunate in purchasing nearly all the coal required for the next twelve months early in the year; and, although the price is considerably higher than was paid last year, it is very much under the present price of the same coals. Notwithstanding the greatly increased price of coal and labour, the committee trust, with care and economy in working, to be able to meet the increased expenditure without an increase of price to the consumers.

MAJOR BOLTON'S REPORT ON THE METROPOLITAN WATERS FOR THE MONTH ENDING AUGUST 16.

The state of the river at Hampton, Molesey, and Sunbury, where the intake of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was very clear and bright from the 16th to the 25th of July, while from the 26th to the 31st it was slightly coloured and turbid. It improved on the 1st of August, and was good until the 6th; but from the 7th to the 12th it was much coloured and slightly turbid, but became clear again on the 13th. The highest state of the river was 2 feet 9 inches above the 4 feet culvert of the West Middlesex Company (or summer level), and the lowest 1 foot 10 inches.

At Ditton (where the Chelsea Company now alone draws its supply), the river was good from the 16th to the 27th of July; it then became indifferent, and remained so until the 11th of August, when it cleared, and has since been good. The highest state of the water at this place was 1 foot, and the lowest 3 inches above the (6 foot) summer level. The highest temperature of the water at Ditton during the month was 73°, and the lowest 63°, while the highest temperature of the air at the same place was 85°, and the lowest 56°. These observations are uniformly made daily at 9 a.m. The rainfall at Ditton during July was 1·71 inches.

During the past month the East London Water-Works Company has completed and opened its new works at Sunbury, and are now supplying water from the Thames in its district. The intake is situated at Sunbury, and the supply is thoroughly filtered at the works, which consist of a complete set of reservoirs and filter-beds; it is thence pumped to the reservoirs at Hornsey for distribution. These new works form supplementary works for securing a supply from the Thames, as auxiliary to the supply from the Lea.

The Lambeth Company has opened the new intake at Molesey, and a considerable improvement in the quality of the water supplied by this company is already apparent. The source of supply having been removed from Ditton to a point above Molesey Lock, the objectionable outflow of the rivers Mole and Rye has been avoided.

This company has also commenced constructing a new service reservoir at Streatham, and are about to cover in the existing one, as recommended; these works are progressing rapidly.

The Chelsea Company have commenced converting the reservoirs at Ditton into filter-beds as recommended. FRANK BOLTON, Water Examiner.

SOUTH STAFFORDSHIRE WATER-WORKS COMPANY.

The Half-Yearly Meeting of the Shareholders of this Company was held at the Offices, Union Passage, Birmingham, on Thursday, Aug. 29—Mr. LLOYD in the chair.

The following report and statement of accounts was presented:—

During the past half year the revenue, although not quite equal to that of the preceding half year, has exceeded the revenue of the corresponding period of last year, and the number of houses has increased by 380, making the total number now supplied 24,228. At the same time, however, the current expenses have largely increased, in consequence of the rise in the rate of wages and in the price of fuel and other materials. There has also been a larger expenditure in repairs of works.

To meet the rise in price of coal, &c., your directors, in March last, gave notice of an increase in the scale of charges for supplies of water for trade use, but as this notice could not take effect until Midsummer, no benefit could arise from it in the accounts for the past half year. Your directors calculate that the higher scale of charges now in operation will produce sufficient to cover the increased current expenses of the company, and that the ordinary yield of the new supplies will be available in addition.

The balance for the past half year, available after providing for interest on loans and preference shares, is £1852 12s. 1d., and your directors therefore recommend the declaration of a dividend on the ordinary share capital at the rate of £2 10s. per centum per annum, free of income-tax. The dividend warrants to be issued on Tuesday, Oct. 1, 1872.

The new works at Wood Green are satisfactorily completed, and they fully realize the expectations entertained of their usefulness and efficiency in maintaining an ample supply in the high-level districts. The new engine at Lichfield is not yet complete, in consequence of the delay of the contractor; but the work is now being energetically pushed forward, and it is hoped the engine will shortly be ready for use.

Dr. *Capital Account, June 30, 1872.* *Cr.*

To Proprietors, for amount paid on orig. shares .	£145,010	0	0	By Works generally, being total cost of works, viz.:—	
Do., for amount paid on Dudley 4 per cent. preference shares . .	6,250	0	0	Accounts rendered to Dec. 31, 1871 . . .	£381,573 13 7
Do., for amount paid on the preference shares created June 27, 1862.	18,750	0	0	Do., to June 30, 1872, viz.:—	
Do., for amount paid on the preference shares created Aug. 30, 1864.	80,000	0	0	Contracts	3,756 18 5
Do., for amount paid on the preference shares, Cl. C, created Sept. 4, 1866	60,000	0	0	Parliamentary and law charges	108 9 4
Amount of debentures on Dec. 31, 1871 . .	74,780	0	0	Bal. at bankers, June 30, 1872.	5,874 15 8
Do. received during the half year ending June 30, 1872.	4,730	0	0		
Debts due to sundry persons	1,893	17	0		
	£391,413	17	0		£391,413 17 0

Dr. *Deposit Account.* *Cr.*

To Balance from last half year	£1,017	12	2	By Special accounts. . .	£11 18 10
Interest	15	1	0	Bal. at bankers, June 30, 1872.	1,020 14 4
	£1,032	13	2		£1,032 13 2

Dr. *Profit and Loss Account, Half Year ending June 30, 1872.* *Cr.*

To Engine charges . . .	£2,469	8	8	By Bal. brought forward, Dec. 31, 1871 . . .	£2,923 2 3
Maintenance of works .	628	6	10	Deduct amount of 21st div., declared Feb. 29, 1872.	2,900 4 0
Wages, turncocks, &c. .	395	11	6		22 18 3
Directors fees . . .	125	0	0	Half year's water-rates.	13,919 4 6
Salaries—secretary, resident engineer, and clerks	632	18	11	Service laying . . .	252 7 5
Collectors commission .	510	14	8		
Rents	305	6	0		
Rates	548	15	2		
Income-tax	217	14	9		
Incidental expenses. .	200	19	8		
Current law charges .	14	14	8		
Discount to landlords .	248	8	2		
Allowances	307	4	0		
Bad debts	17	1	10		
Interest on loans . .	1,711	4	0		
Do. on preference shares	4,008	9	3		
Balance carried down .	1,852	12	1		
	£14,194	10	2		£14,194 10 2

Dr. *Balances, June 30, 1872, on Revenue Account.* *Cr.*

To Sundry persons for goods supplied	£1,566	9	7	By Sundry persons for water rates, service accounts, &c.	£3,803 0 2
Do. proprietors for unclaimed dividends .	99	13	11	Stock on hand of lead and brass work, coals, oil, and tallow, &c. .	964 19 8
Do. for interest on preference shares . . .	4,033	1	9	Bal. at bankers, June 30, 1872.	2,711 13 7
Balance	1,852	12	1	Do. in secretary's hand.	12 3 11
	£7,551	17	4		£7,551 17 4

The CHAIRMAN said that when they met six months ago it was stated that great alteration was taking place in the price of coal, and in current expenses connected with the concern, and which would in all probability—were certain, he might say, to interfere with their next dividend. It was also stated that the directors were taking the earliest steps possible to raise the rates they were charging the public for water. Those steps were taken immediately after their last meeting; but, as three months notice had to be given, of course they did not take effect until the commencement of July, since which time they had been in operation. The water supplied to the district during the half year had also been greatly in excess of that previously supplied. A new engine had been put down at Wood Green, and in part supplied a deficiency which was before complained of. The result, however, had been that they had pumped into the district more water by 80 million gallons than previously, but received no remuneration whatever for it. He could hardly say what had become of the 80 million gallons, unless he attributed it to the increased pressure and increased waste. He only hoped it had done good in some quarters; it certainly ought to have done a great amount of good. The erection of an engine at Lichfield was progressing. It was not completed, but he hoped it would be before they met again; and then, he thought, they would be masters of their position, and enabled to fully supply all the district they had undertaken. The increases to which he had referred were matters over which the directors really had no control; but they had taken steps to enhance the income of the company, and these steps he had no doubt would meet the case in future. In other respects, so far as he could judge, the accounts were as regular and satisfactory as ever. The chairman concluded by moving the adoption of the report and statement of accounts.

Mr. LINDER seconded the motion.

In reply to a question, the CHAIRMAN said he could not say that Burton had answered the expectations of the directors, but the supply paid its way, and it was anticipated that there would be an increase there, as in other parts of the district the company supplied.

Mr. BARNETT said he was afraid the directors did not take action quite soon enough to get an advance upon the water-rate from the ratepayers.

The CHAIRMAN repeated what he had previously said, to the effect that the directors took action as soon as they could. The prices were advanced far beyond what anybody anticipated, and he was not quite sure that if the directors had had any idea that prices would be raised as they had been they would have advanced their prices of water still more.

A SHAREHOLDER asked what advance had actually been made in the rates for water.

The CHAIRMAN replied that the price of the domestic supply was fixed by Act of Parliament; it was only on the trade supply that they had the power to increase the rates to any considerable extent. The rates had been increased on no fixed per centage, but on a scale in proportion to previous charges. The increase amounted to 10, 15, and 20 per cent.

Mr. BARNETT asked whether that increase would make up the amount of extra expense which had been entailed.

The CHAIRMAN, in reply, said that three months ago calculations were made, and figures were gone into very carefully and very accurately, and the increase in the income, it was found, would be considerably beyond the increase in expenditure.

Mr. BARNETT asked if it was too late to make a further increase, if deemed necessary.

The CHAIRMAN said there were two sides to every bargain. They had the trade to supply, and even the lately increased prices were considered by some of their customers too high. The directors had to study the interests of the company, so as to retain their customers. He had no doubt the returns submitted to them at the next meeting would be satisfactory.

The motion for the adoption of the report was then carried, and a dividend was declared on the preference shares, at the rate of £5 per cent. per annum, and on the Dudley preference shares at the rate of £4 per cent., less income-tax. A dividend on the ordinary share capital at the rate of £2 10s. per cent. per annum, free of income-tax, was also declared.

The meeting terminated with a vote of thanks to the chairman.

BERLIN WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held on Monday, Aug. 19—J. C. SIM, Esq., in the chair.

The SECRETARY (Mr. Fesch) read the following report:—

The directors beg to present their usual half-yearly report to the shareholders of the Berlin Water-Works Company.

The revenue account shows an increase of £2154 16s. 3d. over the preceding half year, and of £2527 1s. 8d. over that of the corresponding half of the year 1871.

In consequence of the continually increasing demand for their water supply, the directors have, after careful consideration of the question, sanctioned the construction of additional filters, trusting that this step, which has for some time past been strongly recommended by Mr. Gill, will give satisfaction to the inhabitants of Berlin, and enable the company to supply a greater number of customers.

On the general revenue account there is a balance to the credit of £38,351 19s. 3d., which enables the board to recommend the usual interim dividend for the half year at the rate of 10 per cent. per annum; this will absorb £30,000, leaving £8351 19s. 3d. to be carried forward.

The directors regret having to announce the decease of their late esteemed and valued colleague, Baron Victor de Magnus. They have filled up this vacancy in the direction by nominating his relative, Mr. George Magnus (a director of the Berlin and Hamburg Railway), subject to the confirmation of the shareholders at the meeting.

The engineer and manager's report, and the financial statement, duly audited, are annexed.

To the Board of Directors.

Gentlemen,—The scarcity of dwelling accommodation in Berlin has increased to an unusual extent during the past half year. This has occasioned an enormous rise in the rental of the dwellings. The rise in the rental has caused a large number of your customers to pay for water by meter instead of by a per centage on the rental. The result has been that 619 meters were fixed during the half year closed on the 30th of June last. The scarcity of dwellings has led to the formation of many building societies, and to great activity in the building trade. The number of blocks of building connected to your pipe system during the half year was 265. In the corresponding period of 1871 it had been but 142. There are now 7180 of the 12,000 blocks of building, estimated as lying within the area of your pipe system, supplied with water from it, and 3023 of these receive water through a water-meter. This very general introduction of the water-meter has reduced the waste of water considerably, so much so, that the per centage of increase in water supplied falls short of the per centage of increase in the numbers of blocks of building connected with the mains. There has been again a great rise in the prices of materials and of labour. To this, and to the change in the system of supply, it is due that the working expenses have increased at a greater rate than the increase in the revenue. Your works have been maintained, and are now in an efficient condition. I beg to forward the balance-sheet and the accounts for the past half year.

(Signed) HENRY GILL, C.E., Engineer and Manager.

The CHAIRMAN said: Gentlemen, as in England the relations of capital and labour are matters of serious consideration, while trade and enterprise are rapidly advancing, so is it in Germany at the present time. Our enterprise has shared in the prosperity of Berlin, though the increased cost of living, of materials, and of labour requires us to expend more than hitherto in maintaining the effective condition of the Berlin Water-Works. We are adding every half year an increased number of consumers; our revenue still rises; the area of our pipe system is wide enough to comprise many more services, and to give the amplest supply of water. The powerful engines and pumps we were permitted by your liberality to erect three years ago are working well, and are of such sufficient force in aid of the original machinery that we are able to distribute in the present hot season 12 millions of gallons of water daily to 466,000 of the inhabitants occupying the buildings served by our mains in Berlin. Our able engineer, Mr. Gill, has long been desirous of constructing additional filtering reservoirs, and the directors agreeing with him in the policy of supplying the purest of water at all times, and of being prepared for a still larger consumption, have finally sanctioned the outlay of an additional sum of about £20,000 to perfect our works. As it may be known to some of you that I visited Berlin in the month of June, I think it is the fit and proper time to inform you of our present relations with the official authorities in that city. The State Commissary has officially notified to us the transfer of the rights and powers of the State under the company's concession to the municipality of Berlin. With the newly-appointed Ober-Burgermeister Hobrecht I had an interview, on the introduction of the State Commissary, Von Wurmb, and from both these distinguished ministers of the Imperial Government I have assurances that, while they are bound to study the interests of the city in respect of the more extended supply of water, our rights and privileges will be honourably regarded. It has been already stated that no extension of time will be granted for continuing our exclusive supply; the powers of the state to purchase by valuation, as provided by the concession, can be exercised by the municipality in 1881, or that time may perhaps be anticipated in treating with us for the purchase of our works at an earlier period, or the municipal body may construct their own works, to come into operation when our exclusive powers cease in 1881. My part, however, was to hear and gather the views and feelings of the Government, of the heads of the municipality, and the public opinion of Berlin. Guarding my remarks in presence of the official representatives of the city, I could only say that the directors of our company were but the exponents of the will of the whole body of shareholders; that we had worked for some years with small return for our investment, and looked for rapidly improving income as only equivalent to our just expectations; that whenever it should be the wish of the city to treat with us, or make such proposals as we considered just and liberally equitable, our shareholders would be consulted; that we could rest content with our existing rights, and should be satisfied with the certain increase of dividends, not fearing the future, after 1881, if we should have to carry on the works without the exclusion of competition. I found our works in excellent order; the new engines and pumps that have been put up are splendid specimens of engineering, and are now doing our immense work in the city. The original engines are put into good order, and now having sanctioned the construction of additional filters, the capacity of our services will still be expansive, and bring us the maximum dividend we can expect under our concession. I have now the pleasure to move the formal resolution:—"That the report now presented be received and adopted."

Mr. PICKERSGILL-CUNLIFFE, in seconding the motion, said: You will recollect that during the last two years we have been altering the mode in which we have been supplying Berlin with water. Hitherto we have given the supply, except to very large consumers, at a certain per centage upon the rental of the houses. We found that a vast quantity of water was wasted, and that our power of continuing to take fresh customers was becoming limited. The consequence was, we have lately supplied the larger consumers with water by meter. That, to a certain extent, has been a loss to our revenue, but I find the water-rates of the present half year over and above those of the half year ending June 30, 1871, show a surplus of £2165; therefore it shows that the increase of the water supply of Berlin has overtaken the loss that we experienced through altering our mode of supply. You will find by reference to the accounts that our gross income amounts to £46,889 for the present half year; but the laying of house services has been exceedingly remunerative this half year, and they amount to £1200. That is occasioned by a great number of individuals taking the water from us and laying down their own mains, and so increasing the house services, and out of the supply of the house services we make a certain amount of profit, and that has been more than usual this half year, which to some extent accounts for the surplus of £2527 over the corresponding period of 1871. Our working expenses, on the other hand, are £748 more than in the corresponding half of last year. That is attributable partly to the fact that we have to pay more taxes. The municipal tax amounts to £280, which we had not to pay before. We have had to increase our collectors staff to the amount of £187. Then there is the erecting of a permanent staging in the engine-house at a cost of £58. These items together amount to £525; and the remaining £223 is caused by the increase of salaries. We have been increasing the salaries not only of our staff, but also that of our engineer; and I am sure no gentleman deserves it more thoroughly than Mr. Gill.

The report was unanimously adopted, and the interim dividend, as recommended therein, was declared. The election by the directors of Mr. Magnus to a seat at the board was confirmed.

The proceedings closed with a vote of thanks to the directors.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

ANNUAL GENERAL MEETING.

(*Continued from page* 737.)

ON THE RELATIVE PHOTOGENIC OR ILLUMINATING VALUE OF VEGETABLE, ANIMAL, AND MINERAL OILS, AND COAL GAS; AND ON THE EMPLOYMENT OF PARAFFIN OIL IN THE MANUFACTURE OF COAL GAS.

By STEVENSON MACADAM, PH.D., F.R.S.E., F.C.S.,
Lecturer on Chemistry, and Consulting Analytical Chemist, Edinburgh.

The communication which I have this year to bring before the notice of the members of the North British Association of Gas Managers may be best considered under two divisions—the first part having reference to the photogenic value of the different illuminants, and the second part taking specially into consideration the production of good town gas from paraffin oil. The latter part is probably the more interesting branch of the subject, but it will be necessary for the better understanding of the relative values of all available light-giving substances, that the photogenic power of different luminants be fully referred to at the outset.

PART I.

ON THE RELATIVE PHOTOGENIC OR ILLUMINATING VALUE OF VEGETABLE, ANIMAL, AND MINERAL OILS, AND COAL GAS.

This part of the communication has special reference to the light-giving power and relative cost of the illuminating agents in common use, and will include the results of a large number of experiments made upon the subject during the last ten years. Considering, however, that great fluctuations occur from time to time in the quality and cost of materials, I have repeated every experiment during the last few months, and have made great additions thereto.

The observations included common dip or tallow, composite, and paraffin candles; sperm, rape, and whale oils; paraffin and petroleum oils; and coal gas.

The illuminating standard of intensity of light was the sperm candle, burning 120 grains per hour; and the relative photogenic power of the flames, as contrasted with the said candle, was determined by Bunsen's photometer. The sperm candles were of the best quality, and burned generally between 120 and 122 grains per hour, and in no case was the trial considered as conclusive where the standard candle burned more than 125 or less than 117 grains per hour. The candle was weighed immediately before and after each experiment, and the requisite calculations were made to bring the light to the standard of 120 grains per hour. The room in which the experiments were conducted was kept at an uniform temperature of 60° Fahr.

Considering that the various illuminating agents employed in these trials were of such different qualities and natures as candles, oils, and gas, sold and purchased respectively by the pound, gallon, and 1000 cubic feet, it appeared desirable, after determining the illuminating or photogenic power according to the pound, gallon, or cubic feet, that the light evolved in each case should be calculated into its equivalent in pounds of sperm. Such a plan of recording the results enables the observer to see more clearly the relative illuminating power of the candles, oils, and gas. And, lastly, the photometric results were contrasted by calculating the light-giving value of each source of light yielded for a given price—say, a pennyworth of the material. In making the calculations, it was necessary to fix on a unit, and it was found best to take the standard sperm candle for one hour as *the unit of a candle hour*, and to reckon any light as equal to a given number of candle hours for 1d., indicating that the light evolved was equivalent to that given by a standard sperm candle for the stated period.

Common Tallow or Dip Candles.—Three sizes of these candles were experimented upon—viz., 6, 8, and 12 to the pound, and the price was 6d. per pound, so that the respective candles cost 1d., ¾d., and ½d. each. The average weights of the candles were 1118, 849, and 611 grains each. The size of the wicks was about the same in each sort, and, when burning, the candles lost in 1½ hours:—

1st, or largest size, 299 grains,
2nd, or medium ,, 297 ,, and } giving an average of close upon 200
3rd, or smallest ,, 300 ,, } grains per hour.

The consumpt of tallow, therefore, in each size of candle was practically the same, and the illuminating value of the light evolved from each was equal to 1·25 standard sperm candles burning during the hour. Calculating that if 200 grains of tallow consumed during the hour were equal to 1·25 candle or

150 grains of sperm burned during the same period, what would 1 lb. of the tallow candles be equal to? The following results were obtained:—

200 : 7000 : : 150 : : 5250 grains of sperm;

or 1 lb. of tallow consumed in common dip candles evolves a light equal to that capable of being obtained from ·75 lbs. of sperm, burned in standard sperm candles of 120 grains per hour.

Composite Candles.—These candles were obtained in three sizes—viz., 4, 6, and 8 to the lb., and respectively weighing 1758, 1165, and 851 grains each on the average. The price was 8d. per lb., so that each candle cost respectively 2d., 1½d., and 1d. During burning for 1½ hours, the loss in weight was as follows:—

1st, or largest size, 260 grains	}	Average consumpt per hour, 154 grains.
2nd, or medium ,, 232 ,,		
3rd, or smallest ,, 199 ,,		

The light evolved during the combustion of the composite candles was in accordance with the relative consumpt, and the average illuminating power was equal to 1·1 standard sperm candle, or 132 grains of sperm. Calculating these figures into 1 lb. of composite candles, and its equivalent in sperm, we obtain the following results:—

154 : 7000 : : 132 : : 6000 grains of sperm;

or 1 lb. of composite candles yields a light which is equivalent to that evolved from ·85 lb. of sperm consumed in standard sperm candles.

Paraffin Candles.—These candles were also in three sizes—viz., 6, 8, and 12 to the lb., and cost 1s. per lb., so that the price of each candle was respectively 2d., 1½d., and 1d., whilst the average weight of each size was 1117, 843, and 567 grains. The loss in weight during 1½ hours consumpt was as follows:—

1st, or largest size, 215 grains	}	Being an average consumpt of 137 grains per hour.
2nd, or medium ,, 206 ,,		
3rd, or smallest ,, 195 ,,		

The light evolved during the combustion of these candles was greater than that given by the tallow and composite candles, being equal to 1·494 standard sperm candles, or 179·28 grains of sperm. This result, calculated into lbs. of paraffin and sperm, gives the following:—

137 : 7000 : : 179·28 : : 9160 grains of sperm;

or 1 lb. of paraffin burned in candles evolves a light equal to that capable of being yielded by 1·3083 lbs. of sperm when consumed in standard sperm candles.*

These experimental results on the candles may be shortly stated thus:—

1 lb. of tallow candles	{ is equal in light- giving power to }	·75 lb. of sperm candles.	
1 lb. of composite ,,	,,	·85 lb. of ,,	,,
1 lb. of paraffin ,,	,,	1·3083 lb. of ,,	,,

Considering, however, the relative cost of the tallow, composite, and paraffin candles, it follows that, value for value, these results require to be amended according to the purchase price of the materials. One lb. or 7000 grains of the standard sperm candle, consuming 120 grains per hour, will necessarily give

120) 7000 (58·33 candle hours.

One lb. of tallow candles is equal to ·75 lb. of sperm, and costs 6d., hence—

1·00 : ·75 : : 58·33 : : 43·74 candle hours from 1 lb.

6d.) 43·74

7·29 candle hours for 1d.

One lb. of composite candles is equivalent to ·85 lb. of sperm, and costs 8d., therefore—

1·00 : ·85 : : 58·33 : : 49·58 candle hours from 1 lb.

8d.) 49·58

6·19 candle hours for 1d.

One lb. of paraffin candles, costing 1s., is equal to 1·3083 lb. of sperm, hence—

1·00 : 1·31 : : 58·33 : : 76·41 candle hours from 1 lb.

12d.) 76·41

6·36 candle hours for 1d.

Sperm, Rape, and Whale Oils.—These oils were burned in two kinds of lamps—viz., 1st., a common flat-wick lamp, such as is used in kitchens and country cottages; and 2nd, an inch Argand lamp with glass chimney, such as is employed in larger rooms. The oils were of excellent quality of their class, and cost at retail prices, sperm oil, 9s. per gallon; colza or rape oil, 5s. per gallon; and whale oil, 4s. per gallon.

Sperm Oil in Flat-Wick Lamps.—The consumpt of oil in 10 hours was 4·12 oz., which gives ·412 oz. per hour; and the average light evolved was equal to 1·306 of standard sperm candles, or 156·72 grains of sperm. Calculating these results into one gallon of the sperm oil—viz., 160 oz., the following results were obtained:—

·412 : 160·000 : : 156·72 : : 60,861 grains of sperm;

or one gallon of sperm oil, consumed in the flat-wick lamp, is equal to 60,861 grains (8·69 lbs.) of sperm candles, burned each at the rate of 120 grains per hour.

Rape Oil in Flat-Wick Lamps.—In 10 hours 3·90 oz. of oil were consumed, and this quantity is equal to ·39 oz. per hour. The light yielded was equal to 1·05 standard sperm candles, or 126 grains of sperm. Carrying on these calculations to the gallon of rape oil, we get as follows:—

·39 : 160·00 : : 126 : : 51,693 grains of sperm;

or one gallon of the rape oil, burned in the flat-wick lamp, evolves a light equal to that yielded by 51,693 grains (7·39 lbs.) of sperm consumed in standard sperm candles.

Whale Oil in Flat-Wick Lamp.—This oil burned at the rate of 3·50 oz. in 10 hours, which gives the hourly consumpt as ·35 oz. The light was equal to ·9 standard sperm candles, or 108 grains of sperm, and calculating this into the gallon of oil,

·35 : 160·00 : : 108 : : 49,371 grains of sperm;

or one gallon of the whale oil, consumed in the flat-wick lamp, is equal to 49,371 grains (7·05 lbs.) of sperm burned in standard sperm candles.

Sperm Oil in Argand Lamps.—The quantity of oil consumed in the Argand lamps was 2·30 oz. per hour, being fully five times the amount capable of being burned in the flat-wick lamp. The light evolved was equal to 13 standard sperm candles, or 1560 grains of sperm consumed during the hour. Calculating into the gallon of oil, the following results were obtained:—

2·3 : 160·0 : : 1560 : : 108,522 grains, or 15·5 lbs. of sperm.

The great increase in light when the sperm oil is consumed in Argand lamps, as compared with that obtained when the same oil is burned in flat-wick lamps, is due to the greater body of oil which is consumed at the same time, and the consequent larger flame yielded by the oil, which enable the oil gas to resist more completely the deleterious effects of the oxygen of the air in intermingling with, and attenuating down, the luminosity of the flame. The practical result is, therefore, that the greater the body of oil which can be consumed in a lamp at one and the same time, the higher the illuminating power which is obtained from a given volume of the oil. The same observation applies to other oils, such as rape and whale oils. These remarks will explain why it is that a gallon of sperm oil, weighing less than 9 lbs., can evolve a light in the Argand lamp, which is equal to that given by 15½ lbs. of sperm burned in candles consuming each only 120 grains per hour. The sperm oil is burning at the rate of 2·3 oz., or 1006·25 grains per hour, whilst the standard candle is only consuming 120 grains, or slightly more than ¼ oz. of sperm per hour.

Rape Oil in Argand Lamps.—The consumpt of oil was 2·133 oz. per hour, and the light evolved was equal to 11·33 standard sperm candles, or 1360 grains, which, when calculated into the gallon of the oil, gave

2·133 : 160·000 : : 1360 : : 102,016 grains, or 14·57 lbs. of sperm.

Whale Oil in Argand Lamps.—This oil burned at the rate of 1·95 oz. per hour, and yielded the light of 9·8 standard sperm candles, or 1176 grains of sperm, and the results, calculated for the gallon of whale oil, yielded

1·95 : 160·00 : : 1176 : : 96,492 grains, or 12·69 lbs. of sperm.

The photogenic results of the combustion of the fatty oils in flat-wick and Argand lamps may be contrasted as follows:—

Flat-Wick Lamps.

1 gallon of sperm oil	{ is equal in light- giving power to }	8·69 lbs. of sperm candles.				
1 ,, rape ,,	,,	7·39 ,,	,,	,,	,,	
1 ,, whale ,,	,,	7·05 ,,	,,	,,	,,	

Argand Lamps.

1 gallon of sperm oil	{ is equal in light- giving power to }	15·5 lbs. of sperm candles.				
1 ,, rape ,,	,,	14·57 ,,	,,	,,	,,	
1 ,, whale ,,	,,	12·69 ,,	,,	,,	,,	

These results may be calculated for the price of oil as well as for the quantity consumed, and may, as in the case of the candles, be reduced to the common standard of candle units for 1d.

Flat-Wick Lamps.

A gallon of sperm oil costs 9s., and evolves a light equal to 8·69 lbs. of sperm; and each lb. of sperm candles, burning at the standard rate of 120 grains per hour for each candle, gives 58·33 candle hours; consequently,

Sperm Oil at 9s. per gallon.

$$\frac{58{\cdot}33 \times 8{\cdot}69}{108} = 4{\cdot}69 \text{ candle hours for 1d.}$$

A gallon of rape oil = 7·39 lbs of sperm candles; therefore,

Rape Oil at 5s. per gallon.

$$\frac{58{\cdot}33 \times 7{\cdot}39}{60} = 7{\cdot}18 \text{ candle hours for 1d.}$$

A gallon of whale oil = 7·05 lbs. of sperm candles; therefore,

Whale Oil at 4s. per gallon.

$$\frac{58{\cdot}33 \times 7{\cdot}05}{48} = 8{\cdot}56 \text{ candle hours for 1d.}$$

Argand Lamps.

A gallon of sperm oil = 15·5 lbs. of sperm candles; therefore,

Sperm Oil at 9s. per gallon.

$$\frac{58{\cdot}33 \times 15{\cdot}5}{108} = 8{\cdot}99 \text{ candle hours for 1d.}$$

A gallon of rape oil = 14·57 lbs. of sperm candles; therefore,

Rape Oil at 5s. per gallon.

$$\frac{58{\cdot}33 \times 14{\cdot}57}{60} = 14{\cdot}17 \text{ candle hours for 1d.}$$

A gallon of whale oil = 12·69 lbs. of sperm candles; therefore,

Whale Oil at 4s. per gallon.

$$\frac{58{\cdot}33 \times 12{\cdot}69}{48} = 15{\cdot}42 \text{ candle hours for 1d.}$$

The following table will show at a glance the respective cost of the candles and the fatty oils, and the relative value of the light obtainable from a given price of each:—

Tallow candles give a light equal to	7·29	candle hours	for	1d.		
Composite ,, ,, ,,	6·19	,,	,,	,,		
Paraffin ,, ,, ,,	6·36	,,	,,	1d.		
Flat-Wick Lamps.						
Sperm oil gives a light equal to	4·69	candle hours	for	1d.		
Rape ,, ,, ,,	7·18	,,	,,	1d.		
Whale ,, ,, ,,	8·56	,,	,,	1d.		
Argand Lamps.						
Sperm oil gives a light equal to	8·99	candle hours	for	1d.		
Rape ,, ,, ,,	14·17	,,	,,	1d.		
Whale ,, ,, ,,	15·42	,,	,,	1d.		

Paraffin Oil.—Five different lamps were employed in the experiments upon the illuminating power of paraffin oil, viz.:—

Small-sized flat-wick or cottage lamps;
Medium ,, ,, parlour lamps;
Large ,, ,, dining-room lamps;
Small Argand lamp with ¾-inch wick; and
Doty's Argand lamp with 1-inch wick.

The oils employed were manufactured by the Uphall Mineral Oil Company and Young's Paraffin Oil Company, and were of excellent quality. The retail price was 2s. per gallon.

Small or Cottage Lamp.—The consumpt of oil in this lamp was ⅝ oz. per hour, and the light evolved was equal to 6 standard sperm candles of 120 grains per hour, or 720 grains of sperm, which, calculated into the gallon of the paraffin oil—viz., 160 oz.—gave the following results:—

·75 : 160·00 : : 720 : : 153,600 grains, or 21·943 lbs. of sperm.

Medium or Parlour Lamp.—Consumed 1⅛ oz. of paraffin oil per hour, and yielded a light equal to 9 standard sperm candles, or 1080 grains of sperm; consequently the photogenic value of one gallon of the oil was

1·125 : 160·000 : : 1080 : : 153,600 grains, or 21·943 lbs. of sperm.

Large or Dining-Room Lamp.—Burned 1½ oz. of paraffin oil per hour, with the illuminating value of 12 standard sperm candles, or 1440 grains of sperm, so that the gallon of oil was equal to

1·5 : 160·0 : : 1440 : : 153,600 grains, or 21·943 lbs. of sperm.

Small Argand Lamp.—Consumed 1½ oz. of paraffin oil every hour, and the illuminating power of the light evolved was equal to that obtained from 9 standard sperm candles, or 1080 grains of sperm, which, calculated into the gallon of oil, gave as follows:—

1·125 : 160·000 : : 1080 : : 153,600 grains, or 21·943 lbs. of sperm.

Doty's Argand Lamp.—Burned a little more than 2 oz. (2·004) of paraffin oil per hour, and yielded a light equal to 19·83 standard sperm candles, or 2380 grains of sperm, which, when calculated for the gallon of oil, gave the following results:—

2·004 : 160·000 : : 2380 : : 190,400 grains, or 27·2 lbs. of sperm.

The foregoing experimental observations demonstrate that the paraffin oil, when consumed in any of the flat-wick lamps, or in the small Argand lamp, evolves the same amount of light from the gallon of the oil; and in this respect the paraffin oil differs materially from the vegetable and animal oils, which, as noticed previously, evolve proportionally more light when they are consumed in larger lamps, and in greater quantities at a time. On the other hand, the paraffin oil, when burned in the cottage lamp with a 6-candle power,

* This amount of light yielded by solid paraffin in candles is theoretically much less than what ought to be obtained from the paraffin, and indicates that there is great room for improvement either in the manufacture or mode of combustion of these candles.

yields as much light from the gallon as when consumed in larger lamps with a 9 or 12 candle power; in other words, two 6-candle power paraffin lamps are equal in light-giving power to one 12-candle power lamp, and will consume exactly the same quantity of oil. The same remark applies to the small Argand lamp, which burns with a 9-candle power, and where for the consumpt of oil the light obtained from a given volume of the oil is neither greater nor less than what is yielded from any of the sizes of flat-wick lamps. Employing, therefore, any of the common constructions or sizes of paraffin lamps, the oil evolves a light strictly proportionate to the amount of oil consumed at the time.

The Doty lamp, however, from the superiority of its construction, and the more perfect combustion of the oil, yields a higher photogenic value from the paraffin oil, in the proportion of 27½ lbs. of sperm to 22 lbs. obtained as equivalent of light in the more common lamps.

The experimental results yielded by paraffin oil may be more readily contrasted with those obtained from candles and the animal and vegetable oils, by reducing the light evolved to the common standard of candle units for 1d., and which was adopted in the previous parts of this paper. Thus—

A gallon of the paraffin oil consumed in the cottage, parlour, or dining-room flat-wick lamps, or in the small Argand lamp, yields a light equal to that capable of being obtained from 21·943 lbs. of sperm burned in standard candles at the rate of 120 grains per hour; and as each lb. of sperm candles gives 58·33 candle hours or units, it follows that the ordinary lamps yield with—

Paraffin Oil at 2s. per gallon.

$$\frac{58{\cdot}33 \times 21{\cdot}943}{24} = 53{\cdot}33 \text{ candle hours for 1d.;}$$

whilst if the paraffin oil is purchased at 1s. 6d. per gallon,

Paraffin Oil at 1s. 6d. per gallon.

$$\frac{58{\cdot}33 \times 21{\cdot}943}{18} = 71{\cdot}11 \text{ candle hours for 1d.}$$

When the results in the Doty lamps are worked out in the same way, it is found that—

Paraffin Oil at 2s. per gallon.

$$\frac{58{\cdot}33 \times 27{\cdot}2}{24} = 66{\cdot}10 \text{ candle hours for 1d.}$$

And when paraffin oil may be purchased at 1s. 6d. per gallon, the Doty results yield—

Paraffin Oil at 1s. 6d. per gallon.

$$\frac{58{\cdot}33 \times 27{\cdot}2}{18} = 88{\cdot}13 \text{ candle hours for 1d.}$$

The foregoing results show at once the great superiority and relative cheapness of paraffin oil as an illuminating agent over any vegetable or animal oils or fat consumed in candles or in lamps. The highest photogenic value obtainable from candles was from the common dip or tallow, which gave 7·29 candle hours for 1d., and the greatest illuminating power of the oils, considering the cost, was given by whale oil, which yielded 8·56 candle hours for 1d., when consumed in common lamps, and 15·42 candle hours for 1d., when burned in the best Argand lamps. With paraffin oil, however, even when consumed in the common flat-wick lamps, there is a return of 53·33 candle hours for 1d.; and when burned in the Doty lamp, 66·10 candle hours for 1d.—the oil being taken at 2s. per gallon; or 71·11 candle hours for 1d., and 88·13 candle hours for 1d. when the oil is 1s. 6d. per gallon. But reckoning the paraffin oil at the higher price, there is a sudden passage from candles giving 7½ candle hours for 1d. and fatty oils giving in common lamps 8½ candle hours for 1d., or in improved Argand lamps 15½ candle hours for 1d., to paraffin oil in common lamps yielding 53⅓ candle hours for 1d., and in Doty's improved lamp 66 candle hours for 1d. Paraffin oil, therefore, is from four to eight times cheaper as an illuminating agent than any of the candles or vegetable and animal oils employed for light-giving purposes.

Petroleum Oil.—Experiments were made with petroleum oil in the flat-wick, Argand, and Doty lamps, and the results, taking cost into consideration, were on the average 1-12th less than those yielded by paraffin oil.

Coal Gas.—In fixing the illuminating value and cost of the coal gas, the comparatively low average price of 5s. per 1000 cubic feet was taken, and the photogenic power of the gas was based upon 28 standard sperm candles. There are many places in Scotland where the price of the gas is higher than 5s., and some towns where it is lower; and there are few towns where the standard of 28 candles is exceeded, whilst there are a number of places where it is less. The adoption of the standard of 28-candle gas at 5s. per 1000 cubic feet is within rather than above the average cost of gas.

Knowing well that the form and size of burner employed in the consumption of the gas had a most material bearing upon the illuminating or photogenic power of such, it was arranged that all the trials should be made with the union or fishtail burner (which yields a higher photogenic return with 28-candle gas than any other form of burner), whilst the sizes of the burners were Nos. 5, 4, 3, 2, 1, and ·5. Care was taken to regulate the pressure, so that each burner should consume as nearly as possible the exact amount of gas in cubic feet which the respective number indicated. Thus, No. 5 burner passed 5 cubic feet, No. 4 consumed 4 cubic feet, &c. The following short table gives the experimental results obtained in these trials:—

Jet.	Consumption of Gas per Hour.	Evolved Light equal to
No. 5	5 cubic feet. ...	28 standard sperm candles.
„ 4	4 „ ...	20·8 „ „
„ 3	3 „ ...	13·8 „ „
„ 2	2 „ ...	7·8 „ „
„ 1	1 „ ...	3 „ „
„ 0·5	½ „ ...	1 „ „

In glancing at these results, there is manifestly a great loss of light as the size of the jet is diminished, and probably the difference will be better observed if the data given above be calculated into the light in standard sperm candles, capable of being obtained from a given volume—say 5 cubic feet—of the gas transmitted through the various sized burners. Thus, 5 cubic feet of gas consumed at a

No. 5	jet evolves a light equal to	28	standard sperm candles.		
„ 4	„	„	26	„	„
„ 3	„	„	23	„	„
„ 2	„	„	19½	„	„
„ 1	„	„	15	„	„
„ 0·5	„	„	10	„	„

So that we lose two candles going from No. 5 to No. 4, or 1-14th of the whole light; and between No. 5 and No. 2 there is a loss of one-third of the illuminating power; whilst between No. 5 and No. 0·5 there is a disappearance of nearly two-thirds of the whole light.

The results given were the best which could be obtained during the consumption of the 28-candle gas in the various jets, with well-regulated pressure, and they are higher than those given in other trials, where the pressure was purposely allowed to be excessive. Indeed, the loss in illuminating power, when the gas is burned with undue pressure, is large, and may be observed from the following experimental data, calculated for 5 cubic feet of gas:—

Fishtail or Union Jet.	Under full Pressure. Consumpt in cubic ft.	Under full Pressure. Candle Power for 5 cubic ft.	Under reduced Pressure. Consumpt in cubic ft.	Under reduced Pressure. Candle Power for 5 cubic ft.
No. 5	4·99	28·14	4·99	28·14
„ 4	4·94	24·02	4	25·98
„ 3	4·36	20·48	3	22·89
„ 2	3·14	15·16	2	19·46
„ 1	2·49	10·94	1	14·95
„ 0·5	1·68	7·04	0·5	10·12

It will thus be observed that there is a serious loss of illuminating power when the gas is consumed under undue pressure; there being in the case of No. 2 burner, which is the more common size used in households, a difference of fully 4-candle power between the light obtained from 5 cubic feet burned at the proper pressure, and that given under excessive pressure.

Taking, however, the best results obtained from the 28-candle coal gas during its combustion from the various sized jets under proper pressures, and calculating the light evolved from such jet, for every 5 cubic feet consumed, into standard candle hours or units for 1d., the following results are obtained:—

No. 5 jet consumes 5 cubic feet per hour, and evolves a light equal to 28 standard sperm candles; consequently, the gas, in being burned from this jet, gives

Coal Gas, at 5s. per 1000 cubic feet.

5)1000
200
28
60)5600
93·33 candle hours for 1d.

No. 4 jet consumes 4 cubic feet per hour, and gives a light equal to 26 standard sperm candles for every 5 cubic feet consumed; consequently,

Coal Gas, at 5s. per 1000 cubic feet.

5)1000
200
26
60)5200
86·66 candle hours for 1d.

No. 3 jet burns 3 cubic feet per hour, and yields a light equal to 23-candle power for every 5 cubic feet consumed; therefore,

Coal Gas, at 5s. per 1000 cubic feet.

5)1000
200
23
60)4600
76·66 candle hours for 1d.

No. 2 jet consumes 2 cubic feet of gas, and evolves a light equal to 19½ standard sperm candles for every 5 cubic feet burned; hence,

Coal Gas, at 5s. per 1000 cubic feet.

5)1000
200
19½
60)3900
65 candle hours for 1d.

No. 1 jet burns 1 cubic foot per hour, with the photogenic power of 15 standard sperm candles for every 5 cubic feet consumed; therefore,

Coal Gas, at 5s. per 1000 cubic feet.

5)1000
200
15
60)3000
50 candle hours for 1d.

No. 0·5 jet, with a consumpt of half a cubic foot per hour, evolves a light equal to 10-candle power for every 5 cubic feet; consequently,

Coal Gas, at 5s. per 1000 cubic feet.

5)1000
200
10
60)2000
33·33 candle hours for 1d.

These results may be tabulated as follows:—

For every 5 cubic feet of Gas consumed.

No. 5	jet gives a light equal to	93·33	candle hours for	1d.	
„ 4	„	„	86·66	„	1d.
„ 3	„	„	76·66	„	1d.
„ 2	„	„	65	„	1d.
„ 1	„	„	50	„	1d.
„ 0·5	„	„	33·33	„	1d.

The foregoing experimental data prove that where much light is required, coal gas is the cheapest of all the illuminants, provided the gas can be obtained of the quality of 28 candles, and at a cost not exceeding 5s. per 1000 cubic feet, and is burned from the larger sized jets. Under these circumstances, and paraffin oil at 2s. per gallon, the gas gives 93⅓ candle hours in No. 5 jet, 81⅔ candle hours in No. 4 jet, and 76⅔ candle hours or units in No. 3 jet; whilst the paraffin oil in Doty's lamp yields 66 candle hours or units for the 1d.; but the gas only gives 65 candle hours in No. 2 jet, 50 candle hours in No. 1 jet, and 33⅓ candle hours in No. 0·5 jet for the 1d. Consequently, whilst the gas is a cheaper illuminating agent in the three larger sized burners or jets, the paraffin oil is cheaper when the gas is consumed in the three smaller jets.

Summary of Results.

The following table will exhibit at a glance the relative illuminating power and photogenic value of the different luminants, taking each as they were burned:—

½d. dip or tallow candle gives	3	hours of	1½	candle power for	½d.
½d. „ „	4½	„	1½	„	½d.
1d. „ „	6	„	1½	„	1d.
Composite candle (average)	5½	„	1·1	„	1d.
Paraffin candle (average)	4·27	„	1·49	„	1d.

Common Flat-Wick Lamps.

Sperm oil gives 3·59 hours of 1·306 candle power for 1d.
Rape oil ,, 6·84 ,, 1·05 ,, 1d.
Whale oil ,, 9·5 ,, ·9 ,, 1d.

Argand Lamps.

Sperm oil gives ·69 hours of 13 candle power for 1d.
Rape oil ,, 1·25 ,, 11·33 ,, 1d.
Whale oil ,, 1·57 ,, 9·8 ,, 1d.

Cottage Lamp.

Paraffin oil, at 2s. per gallon, gives 9 hours of 6-candle power for 1d.

Parlour Lamp.

Paraffin oil, at 2s. per gallon, gives 6 hours of 9-candle power for 1d.

Dining-Room Lamp.

Paraffin oil, at 2s. per gallon, gives 4½ hours of 12-candle power for 1d.

¾-inch Argand Lamp.

Paraffin oil, at 2s. per gallon, gives 6 hours of 9-candle power for 1d.

Doty's Lamp.

Paraffin oil, at 2s. per gallon, gives 6 hours of 11½-candle power for 1d.

No. 5 Jet.

28-candle gas, at 5s. per 1000 cub. ft., gives 3½ hours of 28-candle power for 1d.

No. 4 Jet.

28-candle gas, at 5s. per 1000 cub. ft., gives 4·16 hours of 20·8-candle power for 1d.

No. 3 Jet.

28-candle gas, at 5s. per 1000 cub. ft., gives 5·55 hours of 13·8-candle power for 1d.

No. 2 Jet.

28-candle gas, at 5s. per 1000 cub. ft., gives 8·33 hours of 7·8-candle power for 1d.

No. 1 Jet.

28-candle gas, at 5s. per 1000 cub. ft., gives 16·66 hours of 3-candle power for 1d.

No. 0·5 Jet.

28-candle gas, at 5s. per 1000 cub. ft., gives 33⅓ hours of 1-candle power for 1d.

Cottage Lamp.

Paraffin oil, at 1s. 6d. per gallon, gives 12 hours of 6-candle power for 1d.

Parlour Lamp.

Paraffin oil, at 1s. 6s. per gallon, gives 8 hours of 9-candle power for 1d.

Dining-Room Lamp.

Paraffin oil, at 1s. 6d. per gallon, gives 6 hours of 12-candle power for 1d.

¾-inch Argand Lamp.

Paraffin oil, at 1s. 6d. per gallon, gives 8 hours of 9-candle power for 1d.

Doty's Lamp.

Paraffin oil, at 1s. 6d. per gallon, gives 8 hours of 11½-candle power for 1d.

From the foregoing table it follows, that a cottager will consume a penny tallow candle in 6 hours, and will only get 1½-candle power of light; whilst, if he purchases paraffin oil at 2s. per gallon, he will obtain, for every pennyworth of paraffin oil consumed in a common small lamp, 9 hours light of 6-candle power. The most economical of candles, therefore, is beat by paraffin oil so completely, that the latter will burn half again as long a time, and give nearly five times the amount of light during the whole period. A similar remark applies to whale oil, which is the most economical fatty oil, and a pennyworth of which will burn for 9½ hours with less than a candle power, whilst the small paraffin lamp will practically burn as long, and give six times the light, for the same sum of money. Not only so, but if the cottager is content with the light of a single candle, and will reduce the size of the flame of the paraffin lamp by simply screwing down the wick, he may burn the paraffin oil with a single candle power, and spread his pennyworth of oil over 54 hours, whereas his penny candle will burn out in six hours, and he cannot stop the rapidity of its combustion.

In contrasting the paraffin oil with coal gas, it will be found that paraffin oil is cheaper than gas in the No. 0·5 jet, as the following calculations will show:—

Paraffin cottage lamp,—9 hours of 6 candles, equal to reduced flame of 54 hours of 1 candle.	No 0·5 jet coal gas gives 33⅓ hours of 1 candle.

The same remark applies to No. 1 jet, where

Paraffin cottage lamp,—9 hours of 6 candles, equal to reduced flame of 18 hours of 3 candles.	No 1 jet coal gas gives 16·66 hours of 3 candles.

When the gas is burned from No. 2 jet, and the paraffin oil is consumed in a common parlour lamp, the gas beats the paraffin, for

Paraffin parlour lamp,—6 hours of 9 candles, equal to reduced flame of 6·92 hours of 7·8 candles.	No. 2 jet coal gas gives 8·33 hours of 7·8 candles.

But when the paraffin oil is consumed in Doty's lamps the two luminants are practically equal, for

Paraffin Doty's lamp,—6 hours of 11½ candles, equal to reduced flame of 8·71 hours of 7·8 candles.	No. 2 jet coal gas gives 8·33 hours of 7·8 candles.

With coal gas at 5s. per 1000 cubic feet and 28-candle power, the gas is cheaper than paraffin oil when the gas is consumed in the No. 3 jet, but if the gas cost 5s. 8d. per 1000 cubic feet, the two illuminating agents are equal. Thus—

2 reduced Doty lamps will yield 4·92 hours of 13·8 candles.	No 3 jet coal gas gives 5·55 hours of 13·8 candles (at 5s.), but 4·90 hours of 13·8 candles, when the gas costs 5s. 8d. per 1000 cubic feet.

The paraffin oil and gas from No. 4 jet only become equal when the gas costs 6s. 6d. per 1000 cubic feet. Thus—

2 reduced Doty lamps afford the light of 3·26 hours of 20·8 candles.	No. 4 jet coal gas gives 4·16 hours of 20·8 candles (at 5s.), but 3·20 hours of 20·8 candles, when the gas costs 6s. 6d. per 1000 cubic feet.

The gas is superior to paraffin when the No. 5 jet is used, until the price of the gas reaches 7s. per 1000 cubic feet. Thus—

3 reduced Doty lamps afford the light of 2·42 hours of 28 candles.	No. 5 jet coal gas gives 3½ hours of 28 candles (at 5s.), but 3·28 hours of 28 candles, when the gas costs 7s. per 1000 cubic feet.

The above comparisons are drawn out on the basis of the photogenic value of the gas and paraffin oil for 1d., and on the assumption that the coal gas is of 28-candle power when consumed at the rate of 5 cubic feet per hour from a No. 5 fishtail or union burner; but in many places the gas does not come up to this standard, and granting that the gas can be purchased at 5s. per 1000 cubic feet, and the paraffin oil at 2s. per gallon, both luminants will still remain equal when the larger gas-jets are used, if the quality of the gas comes below 28 candles. Thus, paraffin oil is as cheap as gas, when the latter is consumed at No. 3 jet, if the gas cost 5s. per 1000 cubic feet, and is of 24·70-candle power, or at No. 4 jet, when the same priced gas is of 21·53-candle power, or at No. 5 jet, when the 5s. gas is of 20-candle power.

The great convenience attendant on the use of coal gas, and the trouble connected with oil-lamps, must always commend the gas for general use, wherever it can be obtained at reasonable cost, but where the charge is exorbitant, the paraffin oil will be found useful and serviceable in the illumination of not only small but of large apartments.

These two luminants are not antagonistic to each other in their chemical construction, or in the economical and photogenic results obtained during their combustion; and considering that the refined paraffin oil, costing 2s. per gallon, becomes almost equal to gas when the ordinary sized jets are used, the question might be asked, if it be not possible to experiment with the crude paraffin oil in our gas-retorts, so as to get cheap illuminating gas from it. Crude paraffin oil can be purchased at a sixth of the price of the refined oil, and it appears probable that if some method of destructive distillation could be devised and followed out, where the crude oil could be entirely broken up into gas which would not condense in the gasometers or pipes, a great and important step would be taken in the advancement of the manufacture of coal gas. Cannel coals are not so cheap as they were, and the shale beds are of vast extent and extremely prolific of oil; so that I cannot resist the thought that the future of gas-making will lie in the discovery of a practical process for transmitting crude shale oil into our gas-retorts, and obtaining therefrom a permanent gas of high photogenic or illuminating power.

Part II.

On the Employment of Paraffin Oil in the Manufacture of Coal Gas.

The general and special results given in the first part of this communication proved that, in an economic point of view, any sort of candle and any kind of vegetable or animal oil burned in common or Argand lamps were far outstripped in illuminating power by paraffin oil and coal gas. It was hopeless, therefore, to expect that the vegetable and animal oils and fats could ever be employed commercially as sources of raw material for the manufacture of town gas. The only oil which at all approached coal gas in economic illuminating power was the paraffin oil, but it must necessarily be distinctly noticed that in the calculations already given, the gas was determined as supplied by meter, and there was no account taken as to internal fittings; whilst the paraffin oil was reckoned by the purchase price, and without reference to the cost of lamps.

In carrying out the idea of obtaining town gas from paraffin oil, I was glad of an opportunity to arrange for a lengthened series of experiments. These were conducted in a small gas-work attached to my laboratories, and which was used generally in the testing of cannel or parrot coals. The crude oil employed in the experiments was supplied by the Uphall Mineral Oil Company, had a specific gravity of 850 (water = 1000), and was of first-class quality. Two methods were adopted in working—the first being to distil the oil into vapour, and then pass the latter through a column of red-hot coke; and the second being to run in the oil as a small trickling stream into a retort filled with red-hot coke. In the earlier trials, the quality and permanence of the gas produced were specially determined, and the relative amount of gas capable of being obtained from a given volume or weight of the oil was left to the later experiments. In all the trials, the photogenic or illuminating value of the gas was determined—1st, on the day it was produced, and immediately on the conclusion of the distillation; 2nd, on the succeeding, or second day, when the gas had remained for fully 24 hours in the gasholder; and 3rd, on the fourth day, when the gas had been stored in the gasholder for full three days after its manufacture.

The following are the experimental results:—

Crude Paraffin Oil into Gas.

A.—*Oil distilled into Vapour, and the latter Passed through Red-Hot Coke.*

Table A	Photogenic Value of Gas in Candles. 1st Day.	2nd Day.	4th Day.
Trial 1.—Medium heat..	33·21 candles	27·62 candles	25·89 candles.
,, 2.—Low heat...	37·46 ,,	26·23 ,,	23·97 ,,
,, 3.—High heat	31·86 ,,	28·42 ,,	26·18 ,,
Mean of 3 trials	34·18 candles	27·42 candles	25·35 candles.

These results prove that gas of high illuminating power can be obtained by the distillation of paraffin oil vapour over a red-hot surface. The retort for the heating of the paraffin oil was placed at the side of the gas-furnace, and the vapour of the paraffin was transmitted through a gas-retort filled with red-hot coke. This plan did not work very well, as there was great difficulty in regulating the proportion of paraffin oil from time to time, and the result was that there was occasional risk of fire and explosion. The experimental data, however, showed that, according to the different temperature of the coke at the time the paraffin vapour was passed over it, a gas was obtained with a photogenic power ranging from 31·86 to 37·46 candle power, which decreased on the succeeding day to 26·23 to 28·42 candle power, and on the 4th day to 23·97 to 26·18 candle power. The decrease in illuminating value was undoubtedly due to the condensation of paraffin vapours which had not suffered destructive distillation during the transmission through the red-hot coke, and the greatest difference was observable in the case of the experiment conducted at the low heat, where the gas possessed 37·46-candle power when freshly made, but on the second day had decreased to 26·23, being a loss of 11·23-candle power, and on the fourth day to 23·97, being a further loss of 2·26-candle power, or a total loss of 13·49-candle power. In the experiments carried on at the medium and high heats, the difference in the quality of the gas from day to day, or the loss in illuminating power was not so great. The whole results are contrasted in the following table:—

Table AA	Loss in Candle Power of Gas. 1st to 2nd Day.	2nd to 4th Day.	Total.
Low heat ...	11·23 candles	2·26 candles	13·49 candles
Medium heat ...	5·59 ,,	1·73 ,,	7·32 ,,
High heat... ...	3·44 ,,	2·24 ,,	5·68 ,,
Mean of 3 trials...	6·75 candles	2·08 candles	8·83 candles

It will be apparent, therefore, that where the temperature is comparatively low to commence with, and where necessarily there is a greater tendency for paraffin vapour to accompany the gas, the storeage of the gas leads not only to the condensation of the vapour, but also to the removal of more proportional candle power than if the original temperature had been higher and less paraffin vapour had been present for condensation in the gas. Whilst, therefore, the lower temperature gave the best illuminating gas on the day of manufacture, yet the high temperature yielded the gas which possessed the greatest stability, and gave the best photogenic results on the fourth day.

Crude Paraffin Oil into Gas.

B.—*Oil allowed to trickle or run in slowly into the Retort filled with Red-Hot Coke.*

Table B.	Photogenic Value of the Gas in Candles. 1st Day.	2nd Day.	4th Day.
Trial 4.—High heat ...	29·86 candles	26·18 candles	24·89 candles
,, 5.—Medium heat	34·78 ,,	27·32 ,,	25·18 ,,
,, 6.—Low heat ...	39·49 ,,	28·42 ,,	25·64 ,,
Mean of 3 trials	34·71 candles	27·31 candles	25·24 candles

These results are not materially different from those given in the previous trials, but the method of working was much more satisfactory. The flow of the paraffin oil could be regulated very exactly, and the disengagement of the gas was regular and steady, so that the chances of an explosion or fire were reduced to a minimum. As previously, the most highly illuminating gas on the day of manufacture was obtained during the distillation at the low heat. The condensation which occurred during the storeage may be observed from the following table:—

Table BB.	Loss in Candle Power of Gas. 1st to 2nd Day.	2nd to 4th Day.	Total.
Low heat ...	11·07 candles	2·78 candles	13·85 candles
Medium heat...	7·46 ,,	2·14 ,,	9·60 ,,
High heat ...	3·68 ,,	1·29 ,,	4·97 ,,
Mean of 3 trials	7·40 candles	2·07 candles	9·47 candles

The foregoing trials having demonstrated that a gas of 25-candle power, and practically permanent for town use, could be obtained by the destructive distillation of paraffin oil over or through red-hot coke, I proceeded to determine the quantity as well as the quality of the gas capable of being yielded by the paraffin oil. For this purpose the oil was allowed to flow at a very slow rate into a retort filled with red-hot coke, and the gas obtained therefrom was passed through condensers and purifiers in the ordinary way, measured during transit through a station-meter, and thereafter stored in the gasholder. Four trials were made at different temperatures, and the following experimental results were obtained :—

C.—*Oil run in slowly into Retort filled with Red-Hot Coke.*

Table C.	Volume of Gas from One Ton of Oil in Cubic Feet.	Photogenic Value of the Gas in Candles. 1st Day.	2nd Day.	4th Day.
Trial 7.—Medium heat ...	21,100	37·28	29·12	26·34
,, 8.—High heat ...	23,240	34·76	27·68	25·43
,, 9.—Low heat ...	19,960	40·27	28·86	25·08
,, 10.—Very low heat...	16,800	44·36	29·76	26·46
Mean of 4 trials	20,275	39·29	28·85	25·83

The illuminating or photogenic value of the gas obtained in these trials is better at the time of manufacture than what was yielded at similar heats in the earlier experiments; and which may be accounted for, from greater experience having been acquired in the working of the apparatus, and from a larger quantity of oil being used and greater volume of gas being obtained in the later trials. The same tendency to condensation, however, on storeage for one or more days is observed, and the loss in candle power is greatest where the heats have been low. The difference in illuminating power of the gas when retained in the gasholder may be observed from the following table :—

Loss in Candle Power of Gas.

Table CC.	1st to 2nd Day.	2nd to 4th Day.	Total.
Very low heat.	15·10 candles	3·30 candles	18·40 candles
Low heat ...	11·41 ,,	3·78 ,,	15·19 ,,
Medium heat.	8·16 ,,	2·78 ,,	10·94 ,,
High heat ...	7·08 ,,	2·25 ,,	9·33 ,,
Mean of 4 trials	10·44 candles	3·03 candles	13·47 candles

These results, as well as those given previously, at once indicate that the great loss in candle power takes place during the first 24 hours, and that a comparatively small daily decrease occurs thereafter. Apparently, the paraffic oil which has been driven over in vapour, and which has not been properly converted into gas by destructive distillation, readily condenses when the gas is brought to rest in the gasholder, and the best evidence of the separation of undecomposed oil in this manner is the fact of the appearance of the paraffin oil in the gas-tank.

The quantity and quality of the gas obtained from the paraffin oil when given in cubic feet and candle power, as in Table C, cannot be so readily compared together, and the total photogenic value determined, as when the results are calculated from the cubic feet and candle power into pounds of sperm, which the total gas in each trial is equal to when the gas is burned at the rate of 5 cubic feet per hour, and the sperm is consumed in candles of 120 grains per hour. I have accordingly calculated the experimental results in Table C into pounds of sperm, as follows :—

D.—*Photogenic Value of Gas from One Ton of Paraffin Oil in Pounds of Sperm.*

Table D.	1st Day.	2nd Day.	4th Day.
High heat	2769·67 lbs.	2205·54 lbs.	2026·26 lbs.
Medium heat ...	2695·57 ,,	2106·62 ,,	1905·51 ,,
Low heat	2755·84 ,,	1975·01 ,,	1716·33 ,,
Very low heat ...	2583·93 ,,	1714·17 ,,	1524·09 ,,
Mean of 4 trials	2701·25 lbs.	2000·33 lbs.	1793·05 lbs.

The loss in the illuminating value between the first and second days and between the second and fourth days is not due to decrease in volume of gas, for the total quantity of gas in each trial remains practically the same from day to day, when allowance is made for consumpt; but it is due to the condensation of the paraffin vapours into oil which is left in the gas-tank. The differences from day to day, or loss of photogenic value by storeage, may be more readily observed from the following table :—

Loss in Illuminating Power of Gas given in Pounds of Sperm.

Table DD.	1st to 2nd Day.	2nd to 4th Day.	Total.
High heat	564·13 lbs.	179·23 lbs.	743·41 lbs.
Medium heat... ...	588·95 ,,	201·11 ,,	790·06 ,,
Low heat	780·83 ,,	258·68 ,,	1039·51 ,,
Very low heat ...	869·76 ,,	190·08 ,,	1059·81 ,,
Mean of 4 trials	700·92 lbs.	207·29 lbs.	908·20 lbs.

In glancing over the two latter tables, it will be at once apparent that the best results have been obtained at the high heats. Not only is the total illuminating power higher on the day of manufacture, but it remains so on the second day and also on the fourth day. There is a greater yield at first, and there is a less loss from day to day when the gas is stored. In the meantime, therefore, it may be advisable to confine the working out of the subject to those results which have been obtained by the destructive distillation of paraffin oil over red-hot coke at a high heat, and in order that the experimental details may be immediately before us, they are repeated in the following table :—

Paraffin Oil into Gas, over Red-Hot Coke at a High Heat.—Volume of Gas from One Ton of the Oil, 23,240 Cubic Feet.

Photogenic value of gas	1st day	34·76 candles	
,, ,, ,, ...	2nd ,, ...	27·68 ,,	
,, ,, ,, ...	4th ,, ...	25·43 ,,	
Value of gas in sperm	1st ,, ...	2769·67 lbs.	
,, ,, ,, ...	2nd ,, ...	2205·54 ,,	
,, ,, ,, ...	4th ,, ...	2026·26 ,,	

In other words, without reckoning the oil which escapes decomposition, and is found in the condensers during the preparation of the gas, or even the oil which separates from the gas in storeage, and which is found in the gas-tank, there are obtained from 1 ton of the crude paraffin oil, 23,240 cubic feet of gas of 25¼-candle power, and practically permanent.

Now, let us apply these results—these experimental facts—and see how far the oil has been utilized, and at what cost the gas been obtained. The experiments made with refined paraffin burning oil in lamps, as recorded in the first part of this paper, affords an excellent standard for arriving at the full photogenic value of both refined and crude paraffin oils. Thus, 1 gallon of the refined oil, with a specific gravity of 815 (water=1000), and consequently 8·15 lbs. to the gallon, yielded, when burned in an ordinary paraffin lamp, a light equal to that capable of being evolved during the burning of 22(21·943) lbs. of sperm in standard sperm candles, and this, calculated into the ton of the oil, gives as follows :—

8·15 : 2240 : : 22 : : 6046·62 lbs. of sperm.

When, however, the same refined paraffin oil is consumed in the Doty lamp, a gallon of the oil evolves a light equal to 27 (27·2) lbs. of sperm in standard candles, which, calculated into the ton of the oil, gives the following results :—

8·15 : 2240 : : 27 : : 7420·86 lbs. of sperm.

The crude paraffin oil is necessarily of less illuminating value than the refined oil, but considering that fully three-fourths of the volume of the crude oil can be obtained, after rectification, as refined oil, we may theoretically declare that the true photogenic value of crude oil is three-fourths that of refined oil. We will thus obtain the following values :—

1 ton of refined paraffin oil in ordinary lamps is equal to 6046 lbs. of sperm.

1 ton of refined paraffin oil in Doty's lamps is equal to 7420 lbs. of sperm.

1 ton of crude paraffin oil, by ordinary lamp data, is equal to 4534 lbs. of sperm; and

1 ton of crude paraffin oil, by Doty lamp data, is equal to 5565 lbs. of sperm.

The latter may be regarded as the full value of the crude paraffin oil as an illuminating agent, and represents the light-giving power of the crude oil under the best arrangements for burning. At the same time, it must not be supposed that, in taking the Doty lamp data instead of the ordinary lamp data, the paraffin oil is placed under too favourable an aspect, for the Doty inch-wick lamp in burning evolves a light equal to 19·83 standard sperm candles, whilst the gas, which we will presently contrast it with, gives, for every 5 cubic feet, a light equal to 28 candles when consumed through a No. 5 jet, and to 19¼ candles when burned at a No. 2 jet. The Doty lamp, with the 19·83-candle power, does not, therefore, place the paraffin oil under more favourable circumstances than the coal gas burned in ordinary sized jets.

The theoretical amount of light which crude paraffin oil ought to give, when the whole oil is distilled into available gas, is equal to 5565 lbs. of sperm; but in the best of our trials—viz., that conducted at a high heat—the gas obtained was only equal on the 1st day to 2769 lbs. of sperm, on the 2nd day to 2205 lbs., and on the 4th day to 2026 lbs. In other words, the gas obtained by practical trial was only equal to one-half of the oil used, when the 1st day's results are considered, and to two-fifths when the 4th day's results are taken. The deficiency was not due to actual loss of oil or of illuminating power, but to much of the oil having escaped transformation into gas, and readily separating from the vapours in the condensers and gas-tank. The oil did not suffer decarbonization to any extent, for the coke taken out of the retort, after a month's trials, was not coated with finely divided carbon or sooty particles, and the proportion of tarry matter found in the condensers was practically at a minimum. The apparent loss, therefore, when the oil is transformed into gas, is due to condensation of the oily vapours, and such condensed oil may be employed over and over again until it is entirely converted into available and permanent gas.

The relative cost of refined paraffin oil, coal gas, and paraffin oil gas may now be considered, and probably this may be best arrived at by calculating the light evolved from each in pounds of sperm for 1d. Now refined paraffin oil at 2s. per gallon, and with the specific gravity of 8·15, costs £27 per ton. Thus—

8·15 : 2240 : : 2s. : : 547 = £27.

and as one ton of the oil evolves a light equal to 7420 lbs. of sperm, it follows that—

£27 or 540s., or 6480d. : 1d. : : 7420 : : 1·11 lb. for 1d.

So that refined paraffin oil consumed in a Doty lamp evolves the light of 1·11 lb. of sperm at a cost of 1d.

Coal gas of 28-candle power, and charged 5s. per 1000 cubic feet, may have its value reckoned in the same way. Thus 5 cubic feet being equal to 28 standard candles of 120 grains of sperm each, or 3360 grains in all; 1000 cubic feet will be equal to 672,000 grains, or 96 lbs. of sperm, at a cost of 5s. Therefore—

5s. or 60d. : 1d. : : 96 : : 1·6 lb. of sperm for 1d.

and thus, coal gas of 28-candle power, and costing 5s. per 1000 cubic feet, when consumed at a No. 5 jet, evolves a light equal to 1·6 lb. of sperm for 1d. When the same gas, however, is burned from a No. 2 jet, where the 5 cubic feet will only evolve a light equal to 19·46 standard candles, or 2335 grains in all, the 1000 cubic feet will be equal to 467,040 grains, or 66·72 lbs. of sperm. So that—

5s. or 60d. : 1d. : : 66·72 : : 1·11 lb. of sperm for 1d.

and the gas is thus equal to 1·11 lb. of sperm for 1d.

Now the crude paraffin oil, with specific gravity of 850, costs 4d. per gallon of 8·5 lbs., and hence—

8·5 : 2240 : : 4d. : : 1005d. or practically £4 4s. per ton,

the price of one ton being £4 4s. When distilled into gas, the practical result is that, on the day of manufacture, gas is obtained from one ton of the oil which is equal to 2769 lbs. of sperm.

On calculating—

£4 4s. or 1008d. : 1d. : : 2769 : : 2·74 lbs. of sperm for 1d.

We have, therefore, without taking into account the undecomposed and condensed oil, a gas equal to 2·74 lbs. of sperm from one pennyworth of crude paraffin oil. On the second day, however, the gas obtained from the ton of the oil was only equal to 2205 lbs. of sperm, hence—

£4 4s. or 1008d. : 1d. : : 2205 : : 2·18 lbs. of sperm for 1d.;

and on the fourth day the gas was only equal to 2026 lbs. of sperm, and thus—

£4 4s. or 1008d. : 1d. : : 2026 : : 2·01 lbs. of sperm for 1d.

The theoretical value, however, of the crude paraffin oil, when fully utilized, was double that of the first day's gas, so that one ton of the oil ought to yield a light equal to 5·48 lbs. of sperm for 1d.

It will be observed, however, that these calculations as to the value of the crude paraffin oil as a source for the manufacture of coal gas are based simply on the price of the raw material, and take no account of the cost of destructive distillation, purification, storeage, or service. In order, therefore, to contrast more readily the relative cost of coal and paraffin oil in the manufacture of permanent gas, I proceed now to calculate the price of crude paraffin oil required to yield 1000 cubic feet of gas. In doing so, we shall take the quantity and quality of gas as obtained on the fourth day after manufacture, when it became practically of permanent quality, and when fully 23,000 cubic feet of fully 25-candle gas were given. This gas represented 2026 lbs. of sperm, or less than two-fifths of the total oil-producing power, which was 5565 lbs. of sperm from the ton of oil. Assuming for the moment that the three-fifths of the oil not converted into permanent gas were recoverable, and capable of being utilized at a future distillation, we calculate the two-fifths of the oil, at £4 4s. per ton, to cost 33s. 7d., which, yielding 23,000 cubic feet of gas, necessarily gives less than 1s. 6d. (1s. 5¼d.) as the actual cost of the raw material, or crude oil, necessary to yield 1000 cubic feet of 25-candle gas.

The above calculation allows 10 per cent. for actual loss, for we have taken the 2026 lbs. of sperm actually yielded as two-fifths of the 5565 lbs., which is the theoretical yield. But let us even assume that 10 per cent. of loss is too little for a process which must be carried out to some extent by unskilled labour, and consider that only one-half instead of three-fifths of the apparent loss of oil is recoverable and capable of being utilized, we have 42s. as the cost of the crude oil for 23,000 cubic feet of 25-candle gas, and thus 1000 cubic feet will cost less than 1s. 10d. (1s. 9¼d.) This latter calculation leaves a margin of 36 per cent. of loss of oil, or fully one-third of the total quantity, which is above what can be reasonably asked for in any technical operation, however roughly carried on.

Another way of showing the value of the crude paraffin oil as a source of raw

material for the manufacture of permanent gas is to calculate the 23,240 cubic feet actually obtained as if the oil were utilized by being returned to the retort and redistilled till the whole oil was converted into gas. Thus, allowing 10 per cent. for contingencies, and reckoning the 23,240 cubic feet as obtained from two-fifths of the oil, we get 58,100 cubic feet for the whole of the ton of the oil, which costs £4 4s.; and thus 1000 cubic feet only costs 1s. 5½d. for raw material; or, assuming that fully one-third, or 36 per cent., is required to cover contingencies, we have double the 23,240, or 46,480 cubic feet of 25-candle gas for £4 4s., being a cost for raw material of 1s. 10d. per 1000 cubic feet. The mean of these two latter calculations is 52,000 cubic feet of 25-candle gas, at a cost of 1s. 8d. per 1000 cubic feet, which I regard as a very probable result, and one likely to be obtained in actual practice where skilled supervision of the operations is rigidly carried out. The strict theoretic yield of the gas from the oil is even much higher, for

2026 : 5565 : : 23,240 : : 63,944 cubic feet;

so that if the practical working on the large scale could realize what the smaller trials can yield us by experiment and calculation, 1 ton of the crude paraffin oil, at £4 4s., ought to yield 63,944 cubic feet of 25-candle gas, at a cost of 1s. 4d. per 1000 cubic feet for the crude oil.

In this paper I have not entered on the question of the employment of shales in the manufacture of permanent gas, but I may state that I have examined a number of these shales for gas-making, and have got results showing that 1 ton of the ordinary shales will yield from 4000 to 7000 cubic feet of gas, with an illuminating power ranging from 20 to fully 30 candles. These and other results I must postpone till another occasion. In the meantime, I may state that the great drawback to the use of such shales in most places, especially in towns, is the useless character of the coke, which is virtually ash, and the relative cost of the carriage of shale to the works, and of the ash from the works.

The employment of shale oil, however, is open to no objection on the cost of carriage, for everything contained in it may be utilized practically. Less purification will be required than in the case of ordinary coal gas, and this will be a saving in washers, scrubbers, lime, and oxide of iron. The facility with which the paraffin oil may be run into the retorts will reduce labour, and lead necessarily to saving in workmen's wages, and the readiness with which the gas is evolved from the paraffin oil may probably result in each retort doing much more work than at present, and may lead to the lessening of the size of the works. The retorts would not require to be opened and recharged with coke, except at long intervals, and hence even the volumes of smoke which emanate from our gas-works may to a great extent be averted.

The general results to be drawn from the experimental observations recorded in this paper are as follows:—

1. That a gas of sufficient permanent illuminating power may be obtained by the destructive distillation of crude shale oil.

2. That, making allowance for the condensation of oily vapours when the gas is stored for several days in gasholders, 1 ton of the crude shale or paraffin oil yields fully 46,000 cubic feet of 25-candle gas, at a cost of 1s. 10d. per 1000 cubic feet for the raw material.

3. That these experimental results are still short of the theoretical yield of gas from the crude shale oil or paraffin oil, for 1 ton, if thoroughly utilized, ought to yield fully 63,000 cubic feet of 25-candle gas, at a cost of 1s. 4d. per 1000 cubic feet for the raw material.

4. That these results, calculated for the shale used in the preparation of the oil, give fully 4000 cubic feet of gas from the ton of the shale.

These experiments and deductions therefrom are highly suggestive of the future of gas-making, and clearly point to crude shale or paraffin oil as the raw material for the manufacture of town gas at no very distant period.

The PRESIDENT: I hope the results mentioned in Dr. Macadam's excellent lecture will be obtained in the long run. I have now to propose a cordial vote of thanks to Dr. Macadam.

The thanks were given with the utmost heartiness.

The President, Mr. Reid, and Mr. Mackenzie (the secretary), were appointed a committee to draw up a report of the proceedings.

On the motion of the PRESIDENT, a hearty vote of thanks was given to Dr. Miller for his kindness in granting the use of his class-room, and the doctor acknowledged the compliment.

Mr. B. M. M'CRAE moved a vote of thanks to the president.

The motion was cordially acted on, and the president replied.

The PRESIDENT: Mr. Milne has given £5 to the committee, to be used in any way they think proper, and I beg to nominate him as an extraordinary member. Mr. Milne was unanimously elected.

The proceedings then terminated.

In the evening the members of the association and friends dined together in the Royal George Hotel. The president was chairman, and the president elect (Mr. B. M. M'Crae) croupier. A happy evening was spent.

SUPPLEMENT TO THE REFEREES REPORT ON THE SULPHUR PURIFICATION AT BECKTON.

REPLY OF THE GAS REFEREES TO THE SUPERINTENDENTS OF THE BOW AND BECKTON WORKS OF THE CHARTERED COMPANY.

To the Assistant-Secretary, Railway Department, Board of Trade,

21, *John Street, Adelphi, Aug.* 4, 1872.

Sir,—The gas referees beg to acknowledge receipt of your letter of the 12th of July, enclosing letters from the Chartered Gas Company relative to the referees reports on the sulphur purification at the Beckton and Bow works of that company.

The superintendents of those works, although giving different explanations, agree in denying all credit to the gas referees for the remarkable improvement which has suddenly taken place in the purity of the gas manufactured by them since the publication of the referees report. The superintendent of the Beckton works says, in one part of his letter, that this remarkable improvement is due merely to the completion of the "original designs;" in another, to the revival of a so-called "process," which he had tried in October and November last, the change in question being merely the charging of one of his two dozen purifiers with lime instead of oxide of iron, with what results will be shown. The superintendent of the Bow works in like manner maintains that the extraordinary improvement in the sulphur purification at his works has not been due to the new process of using lime purifiers recommended by the referees, nor to any suggestions which he has ever received from them, but only to a trivial alteration in the slaking of the lime.

These explanations must appear to every one cognizant of such matters singularly unsatisfactory and utterly inadequate. It would appear as if there had never been any sulphur difficulty at Beckton at all, and also that the whole sulphur question, which for so many years has baffled the ablest chemists and gas engineers, could be solved, according to Mr. Trewby, by simply using one more of his numerous purifiers with lime and one less with oxide of iron; and, according to Mr. Harris, by only making a trivial change in the slaking of the lime. The mere statement of such a case is sufficient to refute it; but, as these superintendents also impugn the accuracy of the referees report, it is necessary to reply to their letters.

First, as to the Beckton works:—

No explanation is offered as to how it happened that the original designs were not carried out until recently. It certainly could not be from want of time, nor could it be from want of money, the expenditure upon the Beckton works having been lavish beyond parallel. The referees, however, can state that the condensers, &c., recently constructed formed no part of the original designs. The said designs have been recently published in a book, with explanatory letter-press, by the chief engineer who constructed the works,* and it is therein manifest that the additions to the apparatus for purification recently made in the Beckton works formed no part of the original designs, and have been adopted only after a year of unparalleled failure—the gas manufactured at Beckton throughout the whole of last year having been 30 per cent. fouler than the gas made at the old works of the Chartered Company, and fouler, indeed, than in any other gas-works in the kingdom.

During Mr. Evans's term of office as a gas referee, he repeatedly assured his colleagues, in the most confident manner, that as soon as the Beckton works were opened it would be seen that the "sulphur" difficulty was at an end. In deference to his authority, the referees frequently, though not with equal confidence, expressed this hopeful opinion until it was wholly falsified by the actual results, and the defects in the purifying apparatus and processes at Beckton became apparent to the referees from their inspections of those works.

The defects may be briefly stated as follows:—

I. CONDENSING.—In the original designs, and up to the present year, there were no "condensers" at Beckton at all. The chief engineer believed that the gas could be adequately cooled and condensed in pipes placed *underground*—a process which wholly failed, the surrounding earth almost entirely preventing any radiation of heat from the gas in the pipes. This fact was pointed out by the referees a year ago, when on several occasions they drew the attention of the superintendent of the Beckton works to the excessive temperature of the gas at the outlet of those so-called "condensing" pipes, at the outlet of the exhausters, and also in the scrubbers, the temperature of the gas at those several points ranging at different times from 104° to 112°.

In consequence of this failure in the original designs, the company have erected several condensing vessels of a kind employed by the South Metropolitan Company, and in some other works, and strongly recommended in the referees "Ammonia Report" published a year ago; in which report the immense importance of an adequate condensation upon all the subsequent purifying processes was likewise dwelt upon. But, from an inspection of these recently erected condensers, it appears to the referees that their construction is far from being satisfactory—the pipes containing the gas being too large and too numerous relative to the quantity of water in the condensing-tanks; the result being that the temperature of the gas as it enters the scrubbers is still as high as 100° Fahr., whereas it ought not to exceed 60° or 70°, as is the case in works where the fundamentally important matter of cooling the gas is adequately attended to—*e.g.*, as at the Blackfriars and South Metropolitan works.

II. SCRUBBERS.—The kind of scrubber adopted at Beckton is certainly not the best, whether as regards purification or economical management. The result was that the ammoniacal liquor obtained from those scrubbers was too weak to have its proper commercial value; and also the liquor only absorbed one-third of the amount of carbonic acid from the gas, relative to the amount of sulphuretted hydrogen, which ordinary scrubbers worked in the ordinary manner do. The serious consequences of this defect as regards the working of the lime purifiers at Beckton have been described by the referees in their report on those works, where the statistics are also given.

III. THE PURIFIERS.—Apart from the fact that the purifiers erected at Beckton are circular, instead of square, whereby there is a loss of space, and also increased cost in construction, there was this great defect in the Beckton purifiers, that the purifying material was disposed in a solid mass 3 feet deep, instead of in a series of trays; for the shallower the mass in which a purifying material (whether lime or oxide of iron) is arranged, the more fully does the material act upon the impurities in the gas. As will be seen from the correspondence subjoined, the referees urged that a change should be made in this respect; and in the beginning of August last a change was made, and each of the purifiers fitted up with four trays, with 6 inches of purifying material on each tray.

IV. MANNER OF USING THE LIME PURIFIERS.—At the time of the opening of the Beckton works (Nov., 1870), the knowledge acquired relative to the working of lime purifiers was so uncertain, in the opinion of the chief engineer of the Chartered Company, that he adopted a mode of using his purifiers whereby the lime was placed after the oxide of iron (a method by which, *inter alia*, it was absolutely impossible to use the lime purifiers according to the process subsequently recommended in the referees report. To use the chief engineer's own words in his "Description of the Beckton Gas-Works," "the purification is effected chiefly by the use of oxide of iron; the final process being to pass it (the gas) through one purifier, in each set of four, charged with lime." The referees felt assured that the process of purification thus adopted at Beckton was fundamentally wrong; but, in deference to Mr. Evans's position in the gas world, they were reluctant to interfere with his carefully considered plans in regard to those works. It is needless to speak of the failure that ensued. However reluctant to differ from their former colleague, the referees, after many verbal communications, found it indispensable in an official manner to call the attention of the Chartered Company to the excessive, and indeed unparalleled, amount of sulphur in the gas supplied from the Beckton works, and to recommend a fundamental change in the mode of using the lime purifiers.

The correspondence on this subject between the gas referees and the secretary, chief engineer, and superintendent of the Beckton works of the Chartered Company was as follows:—

The Gas Referees to the Secretary of the Chartered Company.

"*June* 2, 1871.

"Dear Sir,—The referees beg to call your attention to the great increase which has taken place in the amount of sulphur in the gas of your company as tested at Gray's Inn Road, which is evidently due to some defects in the purifying processes at Beckton. The Beckton gas contains 30 per cent. more sulphur than the gas manufactured at your old stations at Brick Lane and Curtain Road, and nearly 100 per cent. more than that manufactured at Bow.

"The referees must require you to give thorough and urgent attention to this matter; as it is indispensable that the Beckton gas should be at least as free from impurity as the gas manufactured at Bow works.

"In the opinion of the referees, it is desirable that the present arrangement of the Beckton purifiers should be changed so as to place the lime before the oxide, as that process gives at Bow twice as good results as are now obtained at Beckton,—unless some better process can be devised by your engineers.

"The referees, however, must add that more than this appears to be required; for the gas at Beckton, where both oxide and lime are used, contains more sulphur than the gas at Blackfriars and Westminster, where oxide alone is employed; from which it appears that there is some defect or deficiency as regards your oxide purifiers, or else in the action of the other parts of your works.

"J. O. Phillips, Esq." "T. FOSTER, Secretary to Gas Referees.

"*July* 11, 1871.

"Dear Sir,—The referees regret to have again to call your attention to the excessive amount of sulphur in the gas manufactured at Beckton—an evil which is now extending over the whole City in consequence of the stoppage of some of your other works. "T. FOSTER.

"J. O. Phillips, Esq."

* "Description of the Beckton Gas-Works, with Selections from the Working Drawings." Prepared by F. J. Evans, Esq., M.I.C.E. W. B. King: 1871.

The Gas Referees to the Superintendent of the Beckton Works.

"*July* 29, 1871.

"Dear Sir,—The referees regret to learn that you have not yet been able to make the alterations in the purifiers, nor to employ the lime before the oxide, as recommended. They must beg of you to have this work done *immediately*.

"G. Trewby, Esq." "T. Foster.

The Superintendent of the Beckton Works to the Gas Referees.

"*Beckton, July* 31, 1871.

"Dear Sir,—I have just received your letter of the 29th, and beg to say that the delay in putting the purifiers to work has vexed me exceedingly, and has arisen from causes over which I have no control. It was only on Friday last that some of the additional sieves were delivered, and then they had to be fitted; however, after working all day yesterday, I have a set of four purifiers charged with lime, which I purpose putting to work to-day.

"T. Foster, Esq." "G. C. Trewby.

The Gas Referees to the Chief Engineer of the Chartered Company.

"*Aug.* 31, 1871.

"Dear Sir,—Mr. Peirce desires me to call your attention to the renewed increase in the amount of sulphur in the Beckton gas, and to inquire if any alteration has been made in the purifying process. "T. Foster.

"F. J. Evans, Esq."

The Chief Engineer of the Chartered Company to the Gas Referees.

"*Horseferry Road, Westminster, S. W., Sept.* 1, 1871.

"Dear Sir,—I have forwarded your letter to Mr. Trewby, who will be better able to reply to it than I can. We are doing all we can in the way of experiment in our endeavours to reduce the sulphur to a minimum, and hope soon to be in a position to effect that object. "F. J. Evans.

"T. Foster, Esq."

The Superintendent of the Beckton Works to the Gas Referees.

"*Beckton, Sept.* 1, 1871.

"Dear Sir,—Mr. Evans has handed to me your letter of the 31st, in reply to which I beg to say that no alteration has taken place in the purifying process, and I am now making experiments to account for the fluctuation in the amount of sulphur. "G. C. Trewby.

"T. Foster, Esq."

The Gas Referees to the Superintendent of the Beckton Works.

"*Sept.* 20, 1871.

"Dear Sir,—I am directed to call your attention to the great relapse that has taken place in your gas as regards sulphur, and to state that it is indispensable that the sulphur at Beckton be kept at a lower point.

"G. Trewby, Esq." "T. Foster.

The Superintendent of Beckton Works to the Gas Referees.

"*Beckton, Sept.* 23, 1871.

"Dear Sir,—I beg to acknowledge the receipt of your letter of the 20th instant, and intended calling at your office yesterday in reference to it, but had not time. I wish you to assure the referees that *I have done all in my power* to keep down the amount of sulphur. I am now, and have been for the past week, *doing all my purification by lime*, but without the desired effect. In fact from this morning's testing, I find that *the lime is not removing a particle of bisulphide; that I have precisely the same quantity in the gas before going into the lime vessels that I have afterwards*. I have resolved on using lime from the same place from which Bow Common is supplied, to see whether that will have any effect."

"G. C. Trewby.

"T. Foster, Esq."

This correspondence shows clearly (if, indeed, a fact so long notorious needs such evidence at all) the extreme gravity of the sulphur difficulty at Beckton. The failure was complete and beyond parallel; and the chief engineer and his superintendent were wholly at a loss even to conjecture the cause of it. It will be observed that not a word is said of the non-completion of the "original designs," or of any good results to be expected on this account at a later period. It is true, that for several months after the opening the works, Mr. Evans had verbally assured his former colleagues that all would soon come right, which was the chief cause of the referees so long delaying to take personal action in this case; but these assurances wholly ceased in the beginning of September last, and by Mr. Trewby no such expectations were ever communicated to the referees at all, whether verbally or by letter.

What the experiments were to which Mr. Evans alludes in his letter of Sept. 1, or whether they were made at all, the referees were never informed; but that, if made, they were wholly unsuccessful is fully shown by the subsequent letter from Mr. Trewby on Sept. 23. It is there stated, that although the whole of the unusually numerous series of purifiers had been charged with lime, the effect upon the "sulphur" was absolutely *nil*, the gas containing as much "sulphur" when it left the purifiers as when it entered them! And the superintendent was reduced to such a state of despair that, as a last hope, he thought that something might be done by getting his lime "*from the same place from which Bow Common is supplied.*" It is needless to say that this hope also was disappointed; but when the case had come to such an extremity as this, the referees felt bound to ascertain for themselves whether the failure were really insurmountable, and at all events to report upon the whole facts of the case. Accordingly they frequently visited the works, and obtained a copy of the daily records kept there—namely, in regard to the kinds of coal used, the quantity of gas distilled per ton of coal, and the condition of the purifiers, so far as shown by the daily testings; and they also examined the temperature of the gas at various points in the processes of purification, all of which information is given in their report.

Although no testings whatever for carbonic acid had been made at Beckton (nor indeed at any other gas-works) in connexion with the purifiers, the referees came to the conclusion that the grand cause of the failure was owing to the imperfect action of the condensing-pipes and scrubbers, whereby an unusual amount of carbonic acid existed in the gas as it entered the purifiers, an opinion which they at once communicated to the superintendent. In their subsequent report they pointed out the necessity for the erection of efficient "condensers," and for improving the scrubbers; and they also recommended a new method of working the lime purifiers whereby the hitherto unaccountable failure at Beckton could be remedied, and the gas perfectly purified from sulphur. This new process was devised with special reference to the twofold action of carbonic acid upon lime purifiers; namely, 1, the conversion of the contents of those vessels into carbonate of lime, which does not absorb sulphur in any form; 2, the power of carbonic acid to displace sulphur from lime which has become sulphuretted by the gas. And the process described for applying this principle was to eliminate carbonic acid from the gas by the first purifiers of the series, in such manner that the lime in the subsequent purifiers shall be converted into sulphide of calcium, which is an efficient material for purifying gas from the sulphur in other forms than sulphuretted hydrogen, and therefore can be used as such.

The superintendent of the Beckton works does not in any way impugn the originality of this process of employing lime in gas purification. Neither does the superintendent of the Bow works do so directly,† but he says that the knowledge requisite for devising one part of the process (namely, a knowledge of the efficiency of sulphide of calcium as a perfect purifying agent for "sulphur") was "doubtless" acquired by the referees from the results obtained at his works. The following are the remarks of these superintendents in regard to lime in the form of sulphide of calcium:—

Mr. Harris.
June 20, 1872.

"As to sulphide of calcium being a 'perfectly adequate purifying agent for sulphur.' The knowledge of this, and of its applicability on a manufacturing scale were, doubtless, obtained by the gas referees from their observation of the working at these works, where lime had been practically used for the sole purpose of removing the sulphur compounds during the last five and a half years."

Mr. Trewby.
June 25, 1872.

"It appears to me that it is necessary to determine in what state the sulphur exists in the gas, and how much of it can be extracted by sulphide of calcium. Some of our eminent chemists, who have deeply studied the question, have not been able as yet to come to a conclusion in the matter. I have endeavoured in laboratory experiments to reduce the amount of sulphur by a more extended system of purification by sulphide of calcium, but hitherto without any great results."

Thus, while the superintendent of the Bow works of the Chartered Company leaves it to be inferred that he was aware that sulphide of calcium was a perfectly adequate purifying agent for "sulphur," and also that its applicability on a manufacturing scale could be seen at his works, the superintendent of the Beckton works of the same company maintains that the efficiency of sulphide of calcium is still a matter of uncertainty, alike in his own opinion, and in the opinion of "eminent chemists who have deeply studied the question," and that even in laboratory experiments he had not been able to obtain satisfactory results. As regards Mr. Harris's statement, it is certainly curious that if he had known how to apply sulphide of calcium as a perfectly adequate purifying agent for "sulphur," he never gave the benefit of this knowledge to his company when baffled in their sulphur purification at the Beckton works, and moreover, when consulted on the subject, was wholly unable to devise any means of remedying the remarkable failure at those works. Neither did he ever employ it as a perfectly adequate purifying agent for "sulphur" in his own works until after the referees sent him a copy of their report. The referees have never claimed to have been the first to discover the chemical fact that sulphide of calcium can absorb sulphur in other forms than sulphuretted hydrogen; but they claim as novel the process of working lime purifiers devised by one of themselves and described in their report, whereby to produce and also employ sulphide of calcium in gas-works in such a manner as to render it a "perfectly adequate purifying agent for sulphur in other forms than sulphuretted hydrogen."

Mr. Harris states correctly that he has given full information to the referees of all that he knew or has done in regard to sulphur purification, although he does not state what was the nature of the information which he thus supplied. The referees, however, have a copy of the information which he supplied to them at their request relative to the various experiments which he had made with lime, and also giving the mode of using it which he found to be the best, and which he employed during the last five and a half years. The document, which is dated September, 1869, is as follows:—

"*Processes experimented upon and used at the Works of the Great Central Gas Company for the removal of Sulphur Compounds other than Sulphuretted Hydrogen from Gas.*

Processes.	Results.
From October, 1864, to December, 1865.—The whole of the coals used were picked over by men and boys, and every visible piece of pyrites picked out.	This did not have sufficient effect to warrant the expenditure on labour and waste of coal incurred.
November, 1864, to June, 1865.—Some gas was experimented upon by passing it through a preparation of soda and lead, a material known as Dr. A. Smith's material.	The results obtained showed a diminution of about half the sulphur compound, but the difficulties of getting the material and in its operation prevented its being used on any extended scale.
January, 1865.—Mixed slaked lime with coals in retorts.	A very little good effected, not worth consideration.
February to April, 1865.—Treated gas, first experimentally, and afterwards largely, by passing it through red-hot tubes in conjunction with steam, a process suggested by Mr. L. Thompson.	Experimentally, nearly the whole of the sulphur compounds were removed without difficulty. When in practical operation the decomposition of the gas occasioned such a deposit of soot in the pipes as to necessitate the abandonment of the process.
In 1865.—Various changes were tried in the manufacture, shortening charges reducing carbonising temperature, varying scrubbing operations, &c., &c.	Not any results produced of sufficient importance to induce any permanent change of system.
July, 1865.—Washed gas with tar.	Not any good.
October, 1865.—Used soda waste.	Not any good.
In July, 1866, used tar and pitch in purifiers.	Not any good.
During last three months of 1866 passed gas on a large scale through red-hot pipes charged with various materials.	The removal of the sulphur was to the extent of about one-third, but the difficulty of heating the tubes and repurifying the gas was so great as that the process could not be practically worked.
During latter part of 1866 experimented of the effect of dry lime used in various ways.	The passing the gas through lime first, and afterwards through oxide of iron, removed about 40 per cent. of the sulphur compounds.

"This process was put into practical operation in January, 1867, and has been continued ever since with results that bear out the experiments first made.

"*Sept.* 1, 1869." "Robt. Harris."

Not a word is here said about sulphide of calcium. Neither is any allusion made to the important effects (twofold and distinct) of carbonic acid upon lime purifiers, the regulation of which constitutes a special feature of the process described in the referees report. And, *à fortiori*, nothing is said as to any means by which sulphide of calcium can be produced and employed in the purifiers as a "perfectly adequate purifying agent for *sulphur*." Indeed, Mr. Harris had never tested his purifiers for carbonic acid at all. The only peculiarity (if it can be so called) of the mode of using lime at the Bow works was, as here stated, to use the lime before the oxide of iron. As already said, although this mode is greatly superior to that of using the lime after the oxide of iron, this superiority was not admitted by the chief engineer of the Chartered Company, who a year afterwards preferred to use the lime after the oxide of iron at Beckton. Lime has been used before the oxide of iron at Bow since 1867, and, as too well-known, this mode of purification has proved inadequate of itself to meet the requirements of the case. Moreover, as Mr. Harris

* The referees have taken the liberty, which they here acknowledge, of calling attention to some of the very important statements in this letter by printing them in italics.

† It must be added, however, that Mr. Harris does make one very direct statement, but of a kind wholly irrelevant. He says: "The assumption by the gas referees of the use of lime being 'their lime process of purification' is entirely unwarrantable." But, as Mr. Harris knows well, the referees never made any such assumption, "the use of lime" in purification being as old as gas-making itself.

himself has repeatedly and continuously avowed, by this mode, or by any mode known to him, it was impossible for him to regulate the purifying action of the lime, or to prevent constantly recurring and excessive fluctuations in the amout of sulphur in the gas made by him. At a meeting between the referees and the gas engineers held on the 30th of May, 1870, he stated his opinion on the subject in the most explicit terms. As the meeting in question was one of unusual importance, the proceedings were reported in shorthand, and afterwards transcribed, by a reporter whose competence is attested by the fact that he belongs to the staff of parliamentary reporters for one of the daily newspapers. Of the gas engineers present at that meeting, the following gentlemen took part in the discussion:—Messrs. Kirkham, Livesey, Mann, Harris, Upward, and Clarke. All the referees were present—namely, Mr. Evans, Mr. Pierce, and Mr. Patterson in the chair. The following extract is from the concluding portion of the proceedings:—

"The CHAIRMAN: It seems to be agreed, then, that at present you have no control over the sulphur?

"Mr. HARRIS: No; if we were to find 30 grains* of sulphur to-morrow I should not know what to do, and could give no reason for the change. In my opinion, companies would not be safe if the maximum was fixed at 50 grains."*

Yet the superintendent of the Bow works, who stated that he did not know any means by which the sulphur could be uniformly kept below 60 or 70 grains (as determined by the present sulphur-test), now finds it quite possible, since the issuing of the referees report, to maintain an average of less than 5 grains, while the maximum amount of sulphur in his gas during the past month has been only 5½ grains per 100 feet of gas.

Moreover, in October last, the enormous quantity of 73 grains of sulphur appeared in the gas manufactured at the Bow works, whereupon the referees wrote to Mr. Harris as follows:—

"*Oct.* 25, 1871.

"Dear Sir,—The referees are perfectly astonished at the enormous rise in the amount of sulphur in your gas during the last three days, the latest returns giving 73·3 grains per 100 feet; and they would be glad to know if you are aware of any circumstance that could have occasioned this great increase.

"R. Harris, Esq." "T. FOSTER.

Mr. Harris did not reply by letter, but he called at the referees office, and stated (what indeed was obvious) that as his crude gas did not contain nearly so much "sulphur" as that shown by the official testings, his lime purifiers must have been giving out some of the "sulphur" which they had previously absorbed, but that he could not explain how this occurred.

It is to be added that Mr. Harris had never made testings for carbonic acid in connexion with his purifiers, and accordingly it was impossible for him to know in what state the lime in those vessels existed. Also, if he had even suspected the true action of carbonic acid upon lime purifiers, he would not have been at a loss to know the real cause of the great fluctuations in their action upon sulphur, or how it happened that more sulphur occasionally appeared in his purified gas than existed in his crude gas.

Nevertheless, as soon as the referees report was sent to him by them, he all of a sudden was able to reduce the sulphur to only *one-fifth* of what he had accomplished before, moreover *getting rid entirely of the fluctuations* up to 30 and even 70 grains, which previously he had been wholly unable not only to prevent, but even to explain.

Next for the letter from the superintendent of the Beckton works.

Mr. Trewby says that he "placed before the referees as clearly as possible all the information and details of experiments which are contained in the report as far as Beckton is concerned." Now, the sole "*experiments*" made at Beckton, or at least which were in any form communicated to the referees, were but one—which was undertaken at the special request of the referees themselves, and which was directed to bring to a practical test the theory held by some eminent chemists and gas engineers, and the best means of improving the purification of gas from "sulphur" would be by allowing ammonia to pass into the purifiers; the result, as shown in the report, justifying the contrary opinion held by the referees. The other information and details given by Mr. Trewby—all of which, as he states, "are contained in the report"—were simply the daily records kept at the Beckton works, and are mentioned as such in the report. The only exception is the analysis of the "liquor," obtained from the Oxford scrubbers (a sample of which, supplied by Mr. Trewby, was likewise analyzed in the laboratory of the referees), and also of the liquor yielded by the Beckton scrubbers, in which case the source of their information was expressly acknowledged by the referees in their report. As regards the daily records kept at Beckton relative to the sulphur purification (given in full in the appendix to the report), the referees have to repeat the remark made in their report, that these statistics throw no light whatever upon the all-important question of the condition of the lime purifiers as regards the absorption of sulphur in other forms than sulphuretted hydrogen, seeing that these vessels were only tested for sulphuretted hydrogen; such testings giving no indication whatever as to the efficiency of those vessels for "sulphur" purification, seeing that (so far as such testings could possibly show) the whole of the lime in the purifiers might exist in the form of carbonate, which cannot absorb sulphur in any form or anything else. Indeed, as shown in the report, the special cause of the failure of the sulphur purification at Beckton was this very fact, that the action of the purifiers was almost entirely nullified by the unusual extent to which the lime was converted into carbonate, by the carbonic acid in the gas—a defect which was first pointed out by the referees, who also in their report prescribed the remedies to be adopted.

It was towards the end of November that this hitherto unnoticed cause of the astonishing failure in the action of the lime purifiers at Beckton was discovered by the referees. No testings whatever had previously been made for carbonic acid in connexion with the purifiers; and it was not till fully two months afterwards (when their report was printed) that testings of this kind were made, and at the special request of the referees. In fact, they arrived at the above-mentioned discovery deductively, from observing the defects in the anterior processes of condensing and scrubbing the gas, whereby it appeared to them certain, as stated in their report, that carbonic acid "*must*' exist in inordinate quantity in the gas as it entered the lime purifiers, thereby converting the lime in the purifiers into the inert form of carbonate.

The cause of delay in issuing the said report may now be stated. Having completed their report, in which the causes of the remarkable failure in the sulphur purification at Beckton were pointed out, and in which the remedies for it were also prescribed, the referees thought it right to give the Chartered Company an opportunity of stating any measures which their chief engineer and his superintendents had taken in order to discover the cause of the great failure, or to remedy it. And although perfectly confident of the accuracy of their own report, and that the remedies which they had prescribed were the right ones, they considered that in a matter of such great importance, it would be satisfactory for the public if the opinions of Dr. Odling and Dr. Letheby were taken on the subject. On the 8th of February, they addressed the following letter to the secretary of the Chartered Company:—

"*Feb.* 8, 1872.

"Dear Sir,—As the sulphur in the Beckton gas continues to be excessive in quantity, the referees beg to inquire whether your company have taken every possible means to keep down the amount of the sulphur; and they hope that you will submit to them a full statement on the subject.

"The referees are aware of the great attention which your engineers have given to the sulphur purification; but in connexion with the question of fixing a maximum, it is requisite for the referees to obtain from you in a formal manner a statement of what has been done to remedy the defects, and of the difficulties which remain to be overcome. "T. FOSTER.

"J. O. Phillips, Esq."

The reply (dated Feb. 9) was as follows:—

"Your letter of the 8th inst. has to-day been laid before the directors, by whom it has been referred to the superintendents, for the preparation of the formal statement which you have requested, and which shall be transmitted to you without delay."

In a subsequent letter, dated Feb. 17, the secretary wrote as follows:—

"I do trust that you will be enabled to withhold your report to the Board of Trade for a few days longer. I think it most important for the interests of all parties that this should be done."

The referees accordingly kept back their report, especially as they were unofficially informed that it would, as soon as received, be laid before Parliament by the Board of Trade; they were desirous to give time to the Chartered Company, and also were reluctant to make public the report, until they could accompany it with a statement from the company of what its officers had to say on the subject. But the statement so asked for, and promised, never came at all; and as it was indispensable that the referees report should be sent to the Board of Trade before the issue of their instructions to the gas examiners for the summer half year (which contained an announcement in regard to the sulphur maximum), the report was at length lodged with the Board of Trade on the 26th of March, and copies were thereupon sent to the municipal bodies and to the gas companies and their superintendents.

The remarkable improvement which thereupon began at the Bow works is evidenced by the following returns of the official testings:—

Sulphur at Bow Common.

In grains per 100 feet of gas.

	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.
Average	24·3	19·4	22·3	22·9	22·2	22·8	12·5	9·4	4·5	4·4
Maximum.	73·3	32·9	28·5	35·1	30·8	36·7	20·2*	14·3	10·6	5·4

* April 4.

These are the monthly returns; but, as Mr. Harris himself stated to the engineers of the Imperial Company, "the average from the 11th of February to the 26th of March was 26·23 grains."

At Beckton the improvement began more tardily. Nevertheless, the 1st of October was approaching, when a sulphur maximum was to come into operation at Bow and Beckton; and at length as great an improvement appeared in the purity of gas at Beckton (relative to its former impurity) as at Bow. The following is a summary of the official testings:—

Sulphur at Beckton.

In grains per 100 feet of gas.

	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.
Average	39·2	41·6	41·6	45·2	44·4	38·7	38·2	27·7	14·0	11·6
Maximum.	50·5	52·8	55·1	53·2	51·2	53·6	48·3	45·1*	19·3	20·1

* May 1.

As will be manifest to any one acquainted with gas purification, the sudden and remarkable improvement here shown in the purity of the gas supplied from the Bow and Beckton works would be a natural and necessary result from the adoption of the new principle and process of working lime purifiers recommended in the referees report. But let us see what the superintendents of those gas-works now say on the subject.

In answer to inquiries addressed to him by the engineers of the Imperial Gas Company in the last week of May, Mr. Harris stated that a great improvement had taken place in the results of his sulphur purification, which he was "quite unable to account for." The only suggestion which he offers being that he is "using the lime fresher than formerly." This change, at least, was adopted from the referees report, where it is stated that "it is also important that the slaking and moistening of the lime should only be done immediately before the material is placed in the purifiers; for the moistened lime absorbs carbonic acid from the air, whereby its action upon the sulphur in the gas is correspondingly nullified." But, as will be seen from the report, this recommendation was given merely as a pendant to the new process of working lime purifiers, which, as already said, has special reference to the double action of carbonic acid upon lime purifiers—a point to which no attention had previously been paid in any gas-works.

In his letter of subsequent date (June 20), to which this reply is specially addressed, Mr. Harris gives another and still weaker explanation of the great and sudden improvement of his sulphur purification, which ensued upon his receiving a copy of the referees report. He now attributes the remarkable improvement of his sulphur purification merely to his "slaking the lime with as little water as possible, and to some extent possibly to the temperature of the gas, as affected by the atmospheric temperature." Mr. Harris has hitherto maintained, as a matter of practical experience, that the purifying action of lime was *impaired* in proportion as the lime became *dry*. At the meeting between the gas engineers and the referees on the 30th of May, 1870, he stated as a practical result of his experience in working lime purifiers that "it is more easy to keep down the amount of sulphur in winter than in summer, because the lime had a greater tendency to get dry in the latter part of the year (*i.e.*, in summer)." The referees may remark, in passing, that any difference which may be occasioned in the action of lime purifiers in winter and in summer is not so much due to the greater dryness of the lime in summer, as to the somewhat higher temperature of the gas at that season in the condensers and scrubbers, whereby the absorption of carbonic acid in those anterior vessels is somewhat impaired. But, be this as it may, any one acquainted with gas purification will not hesitate for a moment to recognize the utter inadequacy of so trivial a change as that of slaking the lime "with as little water as possible" to produce the remarkable improvement in the sulphur purification at Bow—especially as the referees can affirm, alike from the statements of Messrs. Harris and Trewby, and from their own observation, that both at Bow and at Beckton the slaking has always been done with so little water as only to render the lime damp enough to slightly retain the impress of the fingers when it was pressed in the hand.

Moreover, according to Mr. Harris's own statement, the efficiency of his mode of using lime, judged by his 5½ years experience of it, is only sufficient to remove 40 per cent. of the "sulphur" contained in his crude gas; whereas now he can take out 87 per cent. Mr. Trewby in his letter states that the "sulphur" in the crude gas at Bow reaches as high as 40 grains—deducting 40 per cent. from which leaves 24 grains. From testings which they made in November, 1870, the referees believe that the correct average of "sulphur" in the crude gas at Bow is 34 or 35 grains—deducting 40 per cent. from which leaves 21 grains. As the official testings above quoted show, the amount of sulphur at Bow was somewhat greater than this, averaging fully 22 grains previous to Mr. Harris's receiving the referees report on the 2nd of April; whereas, since that date, the sulphur in the gas made at Bow has suddenly fallen to an average of only 4½ grains! while the great fluctuations, up to 30 and 70 grains, have wholly disappeared! If Mr. Harris will adopt yet another suggestion from the referees as to the working of his purifiers, he will find it advantageous to dispense with so large a number of oxide of iron purifiers, by charging one of them at least with lime.

Next, as to the corresponding and equally great improvement which has

* At that time the Letheby sulphur test was still in use, and the figures given by Mr. Harris would be respectively about 3½ and 64 grains now that the referees sulphur test is employed in the testing-places.

taken place in the sulphur purification at Beckton. Mr. Trewby accounts for it as follows:—

"On October 24, last year, I adopted the process, the beneficial results of which were communicated by me to the referees, and appear in the statistics published by them. I was obliged to defer the further use of the process until the recent completion of our catch purifiers. It is now in successful operation, and fully realizes the good result which I led the referees to expect from it."

The referees may remark that they were never informed by Mr. Trewby of the "good results" which he expected to reap from this so-called "process," nor yet of his intention to resume it at a later period; his reason for dropping it (as stated in the referees report) being that it occasioned too heavy a back pressure. But, as fully shown in the referees report, this so-called process was merely this, that "the first purifier of the third set [in one of the purifying-houses] was changed from oxide to lime." In other words, instead of using eight purifiers charged with lime, and four with oxide of iron, nine purifiers were used with lime, and three with oxide. This was the amount of the change, which is now called a "process." And what were the results? During the 27 days when this additional lime purifier was in use, the sulphur in the gas from the No. 1 purifying-house, where alone this change was made, averaged 33 grains, and at times exceeded 40 grains, according to Mr. Trewby's own testings. And, as shown by the official testings, the gas supplied from the works during the same period contained on the average 38·2 grains, rising at times to 47 grains. Indeed, as stated in his letter of the 23rd of September, Mr. Trewby had previously tried using *all* his purifiers (of which there are no less than 12 in each purifying-house) with lime, with absolutely no effect upon the "sulphur;" to use his own words, "the lime is not removing a particle of bisulphide—I have precisely the same quantity in the gas before going into the lime that I have afterwards."

CONCLUDING REMARKS.

Thus Mr. Trewby, after doing his best for nearly a year and a half, found his gas as inordinately foul with sulphur as at the opening of his works—namely, containing on the average from 40 to 45 grains of sulphur; yet now he is able to reduce the sulphur to an average of 13 grains, an improvement exceeding 300 per cent., and which the referees feel assured can be carried still further.

In like manner Mr. Harris, after using lime purifiers for about 5½ years without being able (according to his own statement) to eliminate more than 40 per cent. of the sulphur, immediately after receiving the referees report has been able to eliminate 87 per cent., besides being able wholly to avoid the great fluctuations in the action of his purifiers, whereby previously the sulphur ever and anon rose to 40, 50, and even 70 grains, without his being able even to explain the cause of it.

The utter inadequacy of the explanations of this great and sudden improvement in the purity of their gas offered by these two superintendents is too manifest to require further comment, especially as the referees are reluctant to discuss the matter further than is absolutely necessary. They must add, however, that a fortnight ago they had occasion to visit Beckton in order to inspect the new purifying apparatus recently erected there, as usual notifying beforehand their intended visit; and although they did not make an investigation of the mode in which the purifiers were worked—which could only be done by "putting to the quest" the overseers and valvemen—they could not fail to see on the works fouled lime, which had been emptied from the purifiers, of the bright green colour of sulphide of calcium, very much greener than had ever been seen at the Bow works, and, it is needless to say, totally different from the almost colourless foul lime as it used to be at Beckton, where it came out of the purifiers almost entirely in the form of carbonate.

The referees feel assured that their report on the sulphur-purification at Beckton, owing to the new light which it throws on the use of lime purifiers, and also on the action of the condensers and scrubbers as affecting these purifiers, will constitute an important starting-point in gas-purification. They have improved, explained, and reduced to a system the purification of gas from sulphur, especially in other forms than sulphuretted hydrogen. Hitherto the best idea which was anywhere entertained as to the elimination of sulphur in other forms than sulphuretted hydrogen was to pass the gas through "foul" purifiers; whereas, as already shown, and as must be manifest to every one on considering the matter, the lime in "foul" purifiers may be wholly, and always is in great part (under the ordinary mode of working lime purifiers) carbonate of lime, which is wholly inert, and cannot absorb sulphur in any form, or anything else. But now, by observing the new principle stated in the referees report, the lime in any number of purifiers can be converted wholly into sulphide of calcium, which is a perfect purifying agent for sulphur in other forms than sulphuretted hydrogen, and can thereafter be employed as such.

Although the capacity of sulphide of calcium to absorb bisulphide of carbon has been known as a chemical fact for several years on the authority of Berzelius, credit may fairly be claimed for ascertaining that it is a perfect purifying material for sulphur (in other forms than sulphuretted hydrogen) in gas-works. But what the referees unhesitatingly claim to be original is the principle of working lime purifiers with reference to the twofold action of carbonic acid upon lime in purifiers, whereby sulphide of calcium can be produced to any desired extent, while at the same time the condition of each purifier is known, and the action of the purifiers can thereby be perfectly regulated, so as to remove the remarkable fluctuations in the action of those vessels which must have continued to prevail so long as the action of the various gas impurities upon the lime was unknown or never practically taken notice of. Such a principle of working lime purifiers, they do not hesitate to say, was never previously recommended in any publication, nor practised in any gas-works.

T. FOSTER, Secretary to the Gas Referees.

CHESTER GAS COMPANY.—At the last meeting of the Chester Town Council, it was stated that the gas company had refused an offer of £117,000 for the purchase of their works. A sub-committee of the council, to whom the matter had been referred, declined to recommend the corporation to put in force their right to effect a compulsory sale.

EAST BARNET GAS AND WATER COMPANY.—The half-yearly meeting of shareholders was held on the 31st ult.—R. Wilkinson, Esq., in the chair. The profits of the company for the six month ending June 30 admitted of a dividend at the rate of 6 per cent. The amalgamation with the Barnet Consumers and the Potters Bar Companies takes effect on the 10th proximo.

HUDDERSFIELD CORPORATION GAS-WORKS.—At the meeting of the Town Council on Wednesday, the 21st ult., the Gas Committee presented the following report:—"At a meeting of the Gas Committee on the 31st ult., the manager of the works reported that the gas and meter rental for the half year ending June 30, 1872, amounted to the sum of £13,045 1s. 7d., and for the corresponding half year of 1871 to £12,534 8s. 3d., showing an increase of £510 13s. 2d. The collector reported that during the month of July the sum of £1752 3s. 10d. had been received. A meeting of the executive sub-committee was held on the 7th inst., when a quantity of new materials was ordered. The manager was instructed to inquire from the Yorkshire Iron and Coal Company the price per ton of cannel coal delivered into the Huddersfield Gas-Works, and the quantity they would deliver per week. The manager was instructed to prepare plans and specifications for a new gasholder-tank. The collector reported that the amount of rental yet to collect for gas, meters, arrears, &c., was £13,892 12s. 2d.; also that he had collected from the 31st of July to the 7th of August £1323 6s. 8d. The general meeting of the committee was held on the 13th inst., when the proceedings of the sub-committee were read and confirmed, and a number of accounts were ordered to be paid."

GLOUCESTER GAS COMPANY.—The half-yearly meeting of this company was held on Wednesday, Aug. 28—Mr. S. Bowley in the chair. The report by the directors showed a net profit of £2477 10s. 3d., which, with £1472 10s. undivided last half year, made a total amount available for dividends of £3950. The dividends recommended for the half year were £10 per cent. per annum upon the class A shares, and £7 10s. per annum upon the class B shares. These dividends would absorb £1948, and leave a balance of £2001 16s. 6d. to be carried over to the next half year. When these were paid the whole of the dividends allowed by the Act of 1856 would have been cleared off. The great advance which had occurred in the price of coal, labour, and materials had of necessity increased the cost of producing gas, and, consequently, affected the profits of the company; and, were it not for the present financial position of the company, the directors would have felt it their duty to recommend an immediate advance in price equivalent to the increased cost of production; but, under the circumstances, they had decided to postpone the consideration of price to the next half year. The erection of some new works, for which a special Act of Parliament was obtained last year, was also deferred in consequence of the extreme prices of all kinds of material used in the erection of gas-works. The report was unanimously adopted, and the retiring directors and auditor were re-elected.

LONGTON GAS COMPANY.—The half-yearly meeting of shareholders was held on Monday, the 26th ult., when the following report by the directors was submitted:—"The directors herewith submit to the proprietors the audited accounts, showing the result of the company's operations during the half year ending the 30th of June last, and which they have no doubt will be regarded as satisfactory. In gas-rental there has been a fair increase over the corresponding period of last year, and the prices received for coke and other products have also improved. The directors have to report the completion of a branch railway into the company's works, which has proved a source of convenience as well as of profit, and that the works of the company have been maintained in a good state of efficiency. The profits of the half year are £1732 3s. 8d., and, with the addition of £199 3s. 4d., the balance unappropriated from last half year, makes a sum of £1931 7s. available for division. Out of this sum, your directors recommend the payment of a dividend of 10 per cent. per annum on the original shares and 7 per cent. per annum on the ordinary 7 per cent. shares; and also that the arrears of dividend on the original shares, at the rate of 4 per cent. per annum, and the same on the ordinary 7 per cent. shares, at the rate of 1 per cent. per annum, be paid for the half year ending Dec. 31, 1867, on the amount of capital then paid up, all free of income-tax, carrying forward an unappropriated balance of £228 2s. 2d."

LIMERICK CORPORATION GAS-WORKS.—At the meeting of the Town Council of Limerick, on the 5th inst., Mr. Hall directed attention to what he considered a very serious matter, and which for some time past was much spoken of by the public. It was rumoured that certain members of the Town Council and members of the Gas Committee purchased coal belonging to the Corporation Gas-Works at cost price. If such were the fact he should designate the conduct of such persons as most disreputable and dishonourable, and unworthy of the trust which was bestowed upon them by the public. Indeed he might say that they misled their constituents in asking them to return them as members of a representative body of the city. Some years ago the practice which he now complained of took place; he called attention to it, and a promise was made that it would not occur again. The mayor called upon Mr. Hall to name the persons referred to, but Mr. Hall declined to do so, and the chairman of the Gas Committee denied all knowlege of the existence of the alleged practice. Alderman Connolly said the fact was that out of the cargoes of coal which come into the port, the Gas Committee took a contract of about 4000 tons, and it so happened that some 50 tons or so remained in the vessels after the required supply had been removed to the gas-works, and that extra supply some members of the council and the Gas Committee purchased at contract price. Mr. Hall gave notice of a motion for the next court requiring the presence of the manager of the works, to answer such questions as might be put to him on this subject.

CANTERBURY GAS AND WATER COMPANY.—The half-yearly meeting was held on the 26th ult., when the following report was submitted:—"The directors have again the pleasure of placing before the shareholders a statement of accounts and balance-sheet for the half year ended the 30th of June last. The accounts, as passed by the auditor, show (with a small balance brought from last half year) a net profit of £2610 13s. 8d. Your directors need hardly call attention to the great increase in the price of coals—an increase which, if permanent, would materially affect the future profits of the company. Should the great rise in price be, as your directors are led to hope and believe, merely temporary, the dividends of the two half years only would be affected. They beg to propose, therefore, that a dividend at the rate of 6 per cent. per annum for the last half year be declared, free from income-tax, which will require the sum of £1815; and that the balance on the profit and loss account be held in reserve to meet any falling off in profits during the ensuing year. All the company's plant is in good working order, and the consumption of both gas and water steadily increases. Owing to the increase in the price of coals, your directors felt they had no alternative but to increase the price of gas to the consumers, and they have, pursuant to the power contained in the company's Act, given notice of an increase of 6d. per 1000 cubic feet from and after the 1st of July last. The arbitrator appointed to settle the differences between the company and the engineer of the new water-works has not yet made his award, and, until this is published, the statement of the cost of the works cannot be furnished to the shareholders."

WAKEFIELD GAS COMPANY.—The ordinary half-yearly meeting of the shareholders in the company was held on Monday, Aug. 26—Mr. William Statter, the chairman of the directors, and engineer to the company, presiding. The chairman, in moving the adoption of the accounts, which showed that the profit for the half year was £3469 18s. 8d., stated that the directors were now paying 12s. and 14s. per ton for ordinary coal, and as much as 17s. per ton for cannel coal, as against 5s. 10d. and 6s. per ton last half year. In order to meet this extra expenditure, they had found it necessary to increase the price of gas 6d. per 1000 feet, and they had advanced coke from 10s. to 15s. per ton. Notwithstanding these advances the directors believed that they would be £200 or £300 short of meeting the extra expenditure and paying the usual dividend, and they would have to make it up by dipping into the reserve-fund. Mr. Moorhouse thought it would have been adequate if the directors had increased the price 3d. per 1000. He considered that colliery proprietors were killing the goose which laid the golden egg, and he did not think the present high price of coal would be maintained very long. The Chairman said the directors found that the increase of 6d. per 1000 would only realize £1062 upon the half year's transactions, and that sum would scarcely meet the extra expenditure. The men employed at the gas-works had that morning applied for an advance of wages. The consumption of gas was not increasing; on the contrary, the early closing movement had decreased the consumption, and no doubt the new Licensing Act would have a similar effect. In addition to this they required about £2000 for the new gasholder and repairing the old one, and therefore he thought they would give the reserve-fund a good sweating next half year without drawing upon it for any other purpose. The balance-sheet was then adopted, and a dividend of 10 per cent. on the old shares, and 7½ per cent. on the new shares was declared. Mr. Moorhouse gave notice that at the next summer meeting he should move that the allow-

ance paid to Mr. Statter for his services as chairman and engineer to the company should be reduced from £120 to £70 per year, and that his five co-directors should receive £25 per year, instead of £20 as at present. Messrs. W. Statter, R. G. Aked, and W. Senior, the three retiring directors, and Mr. G. V. Ellerton, the retiring auditor, having been reappointed, the meeting was brought to a close with a vote of thanks to the directors.

PRICE OF GAS AT HEREFORD.—The Gas Management Committee of the Hereford Town Council have determined to recommend that for the current quarter the price of gas shall remain as heretofore, at 4s. per 1000. As, however, the stringent powers of the general gas Acts render anything like an inducement to prompt payment unnecessary, it is not intended to continue the system of discount, which the old gas company introduced. Whether an increase in the price of gas will be necessary next quarter will, of course, depend upon the price of coal.—*Hereford Times.*

PUBLIC LIGHTING AT HEREFORD.—At the meeting of the Town Council on the 3rd inst., the Gas Committee reported that they had met the Gas Management Committee relative to the costs of lighting the public lamps, and the offer made to light the lamps according to the present scale was £4 11s. 8d. per lamp, being an increase of 19s. 2d. per lamp per annum; and they had directed the finance-clerk to prepare a statement showing what rate would be required to meet the increased cost, and also what rate would be necessary if the lamps were lighted nine hours per night instead of ten hours and a half. Such returns, with the recommendation thereon, would be laid before the council at their next meeting.

THE EXTRAORDINARY OUTRAGE AT THE ROSSENDALE UNION GAS-WORKS.—On Wednesday, August 28, at the Preston intermediate session, Henry Alfred Wadman, late sub-manager at the Rossendale Union Gas-Works, was brought up, and pleaded "not guilty," on the charge of committing wilful damage, on the 13th of July last, and other days, at the Fall Barn Gas-Works, by tampering with the plugs. The evidence against the prisoner was reported in the JOURNAL of the 30th of July last. Mr. Blackledge, the manager, now stated that the quantity of gas which escaped on one single night alone (13th of July last) through the wilful act of the prisoner was from 60,000 to 70,000 cubic feet. The value of the gas which had since escaped otherwise than by consumption (63,259 feet at 4s. 3d. per 1000) was £13 8s. 7d., and they now charged the prisoner with doing damage to that amount. The jury returned a verdict of guilty against the prisoner, and he was sentenced to be imprisoned with hard labour for six calendar months.

PROPOSED PURCHASE OF THE DEWSBURY AND BATLEY GAS-WORKS.—On Tuesday, Sept. 3, a meeting of the Dewsbury Town Council was held in the Council Chamber, under the presidency of Mr. Mark Newsome, mayor. The minutes of the Joint Gas Committee were read and passed, which contained a resolution instructing the clerks to the corporations of Dewsbury and Batley to write to the directors of the Dewsbury and Batley Gas Company that the councils were prepared to give £12 for each of the £5 fully paid-up shares under class A, and £9 for the £5 shares, under classes B and C; and that if the directors did not accept the offer for purchase of the gas-works, the committee would recommend the councils to apply to Parliament for a bill to cause a compulsory sale of the gas-works to the two corporations. The town-clerk said no communication had been received in reply to the above.

STRIKE AGAINST THE ADVANCE IN THE PRICE OF GAS.—For some time past, the gas consumers of Rastrick and Clifton have been dissatisfied with what they consider the exorbitant prices charged for their supply of gas. A meeting was held on Wednesday evening, Aug. 28, at the Sun Inn, to discuss the best means of obtaining a reduction in the price of gas. Mr. S. Hirst presided, and pointed out that the Rastrick Gas Company were charging them 4s. 9d. per 1000 for their gas, while they were supplying Clifton Bridge at 1s. per 1000 less, and the railway station at 1s. 3d. less. He explained that the company were not allowed to have a dividend above 10 per cent., but so confident was he that the company were reaping large profits, that many of the shares were worth 20 per cent. After some discussion, it was unanimously resolved that after next Monday they would cease to burn the gas supplied by the Rastrick Company unless the price was considerably reduced. On Thursday, the 29th ult., a meeting, at which a similar resolution was come to, was held at the George Inn.

PUBLIC LIGHTING AT ABERDEEN.—A report presented by the police surveyor to the meeting of the Town Council on the 19th ult. states that the public gas-lamps and fittings throughout the city are now in a most efficient state, the whole of them having been overhauled and repaired during the summer season by the staff of lamplighters (six men) placed at his disposal for the purpose; 300 lamp-columns, 70 wooden posts, 800 lamp irons on walls and railings, and 1500 lamp-tops and rims have been painted, 4 cwt. of paint having been used. Other work has been done by the lamplighters and by the tinsmith contractor. The lighting season commenced on Thursday, Aug. 15, there being 1932 lamps with single jets and 91 with double burners. The force for the winter consists of three foremen at 16s. per week, four merit class men at 15s. per week, and twelve men at 14s. 6d. per week—the total of the weekly pay amounting to £14 2s. The committee state that the arrangements thus carried out for repainting and repairs had been more economical than if the work had been wholly effected by tradesmen, while at the same time the men of the lighting force had been kept in employment during the summer.

PUBLIC LIGHTING AT HUNTINGDON.—At a special meeting of the Paving and Lighting Commissioners of this town, held on the 21st ult., a communication was read from the gas company, stating that they intended to increase the price of gas for the public lamps, on and after Sept. 1, to the extent of 10d. per 1000 cubic feet. It was resolved that a temporary contract be entered into with the gas company for the lighting of the public lamps at the cost of 6s. 4d. per 1000 cubic feet, it being understood that a reduction in the price will be made without delay on the decrease in the cost of coals. With the exception of the above price, the terms of the contract of Oct. 9, 1866, are to be continued. It was also resolved that a committee, consisting of Messrs. Peacock, Cawley, and Dear, be appointed, for the purpose of ascertaining (the cost not to exceed £5), by such means as they may consider most satisfactory, the quantity of gas capable of being consumed by the several public lamps, and report thereon at the next quarterly meeting. It was further resolved that, in consequence of the high price of gas, the surveyor be instructed to have the lamps put out one hour earlier every morning till further notice.

FATAL ACCIDENT AT THE CHARTERED GAS-WORKS.—On Tuesday last Mr. S. F. Langham held an inquiry at the Westminster Guildhall respecting the death of George Leak, aged 38, a plasterer. Daniel Charman, said that on the previous Saturday afternoon the deceased was engaged with him at the Chartered Gas-Works, Westminster. He was colouring a wall in the engine-room, and had a pail at his side. He was stooping down to put his brush into the pail when he came into contact with the machinery of the exhauster and was dragged into the wheel, which was in full motion. Witness raising an alarm, the engine was at once stopped, but when the poor fellow was extricated he was quite dead. A portion of his head was torn off. Mr. Charles Edmund Jones said he was foreman at the Chartered Gas-Works. He found the deceased with his head between the leather strap and the wheel of the machinery. There was a distance of 2 feet 10 inches between the exhauster and where the deceased was at work. Witness was of opinion that deceased fell forward, and was dragged into the wheel through catching hold of the strap to save himself. There was no railing round the machinery. It was necessary to keep the exhauster always at work. The coroner having summed up, the jury returned a verdict of "Accidental death," and expressed an opinion that when such work as that in which deceased was engaged was going on the machinery should be stopped.

FATAL ACCIDENT AT HEBBURN.—On Wednesday morning, Aug. 21, about seven o'clock, a distressing and fatal accident occurred at the St. Bede Chemical Works, Hebburn, by which one man lost his life and the lives of two more were placed in great jeopardy. It appears that that morning Mr. Turnbull, one of the foremen at the works, had mentioned to a labourer, named Henry Logan, that he wanted a gas-tank, that had not been in use for some time, examined, and about seven o'clock Mr. Turnbull was passing near to the tank and saw the manhole door of the tank (which was covered in) taken off, and a pair of boots lying on the ground close beside it. He at once ran to the opening, and to his horror saw Logan lying down on the bottom in a state of insensibility. He called for assistance, and a labourer named Jennings coming, the two entered the tank to endeavour to rescue Logan; but no sooner had they got fairly in than they were rendered insensible. Other workmen, however, hearing Mr. Turnbull's alarm, came to the spot, and without loss of time got him and Jennings out from among the poisonous gases. The body of Logan was also speedily recovered, and medical aid was sent for. Dr. Whamond, of Jarrow, was soon in attendance, and every means was resorted to with the view of restoring the three men. Fortunately, after some exertions, Turnbull and Jennings recovered their consciousness. At the inquest the jury returned a verdict of "Found dead in a tank," and appended a recommendation that the company exercise greater care in future in warning workmen of the danger arising from the gases in the tank.

THE RYDE GAS-WORKS QUESTION.—At the meeting of the Ryde Borough Council, on Wednesday last, a letter was read from Messrs. Davies, Campbell, Reeves, and Hooper, solicitors, of London, stating that they had been instructed by Sir Collingwood Dickenson, Bart., and other influential ratepayers, to apply to the Court of Chancery for an injunction to restrain the corporation from purchasing the gas-works, but, before instructing counsel, they desired to ascertain whether the members of the corporation intend to proceed to carry such alleged contract into effect. Alderman Paul moved—"That a letter should be written to Messrs. Davies and Co., informing them that the papers relating to the purchase of the gas-works are before counsel, and that the corporation will act in this matter as they may be advised." In doing this they would escape blame from every side, because they were taking the only course open to them. Alderman Thomas Dashwood seconded the motion. The Mayor, with the consent of Alderman Paul, and at the wish of several members, altered the resolution to the following:—"The papers relating to the purchase are before counsel, but at present we are not able to answer the questions put." All the members thought that this would do, and on the motion being put it was carried—Messrs. Thurlow and Gunn being neutral, the former, as he said, because he was a gas shareholder. Mr. Knight had previously left the room. Mr. C. Colenutt gave notice that at the next meeting, on Thursday, he would move—"That no further expenses shall be incurred in respect to the purchase of the Ryde Gaslight Company's works until the provisions of the 4th section of the Municipal Corporations (Borough Funds) Act have been complied with." Mr. Colenutt said he intended to have moved that at the present meeting, but as it was a matter requiring much consideration, he thought it had best be put off till the next meeting. This was agreed to.

MANCHESTER GAS SUPPLY.—At the meeting of the Manchester Town Council, on the 5th inst., the Gas Committee presented their report for the year ending June 24 (which, with the accounts appended, will appear in our next). The report was adopted. Alderman King moved—"That the price charged for gas be increased 2d. per 1000 cubic feet in all the districts except those beyond the river Mersey, such advance to take effect from the 29th day of September." He said that the reports showed that the gross profit accruing from the gas-works this year was £63,227, against £79,300 last year, showing a decrease of more than £6000. This was accounted for by the increased cost of coal and cannel, and also by the disorganization in the labour market. It was an understood thing that the Gas Committee should make a profit equal to 10 per cent. upon its gross capital. For three or four years past it had been possible to make this per centage of profit; but in order that the business might go on as regularly as possible, and without making a sudden change in price, the committee had refrained from making an advance. £77,000 would amount to 10 per cent. on the capital of the corporation, and an increase of £1 per 1000 amounted to £6000. Next year the cannel used at the works would cost something like £24,000 more than last year, and this additional item would bring down the profit of next year to £38,000. On the other hand, the committee expected to get more for coke—an uncertain item—which they might put down at £10,000; and they also expected to get £2500 or £3000 on other items, which would bring up the profits again to £51,000 per year; but this was still £26,000 short of the sum which would be necessary to declare profits at 10 per cent. This had brought the committee to the clear conviction that it was necessary that some advance should be made in the price of gas. Advances were being made all over the country from 2d. to 1s. 6d. per 1000, and there had been a strong feeling in the committee that the increase should be at the rate of 4d. per 1000 feet. The Gas Committee, however, were anxious to make the increase as light as they could, and although 4d. per 1000 would have been more consistent with good commercial principles, they had resolved to limit the increase to 2d. this year. At the same time he reminded the council that probably next year another increase would be required. Alderman Lamb seconded the resolution. Mr. Ingham moved as an amendment the rejection of the motion, which was seconded by Mr. Griffin. Alderman Curtis, Alderman Grundy, and Mr. Anderton supported the recommendations of the committee, which were ultimately adopted.

THE GAS AND WATER QUESTION IN DURHAM.—At the meeting of the Durham Board of Health on the 4th inst., the Mayor (Alderman White) presiding, letters were read from the secretary of the gas and water company, intimating the rise in prices in consequence of the increase in the cost of materials, &c., similar to what had been served on their other customers. The mayor thought the matter should be referred to the Gas Lighting and Pant Water Committee, and suggested that until that body had reported on the matter all discussion on the question should stand over. Mr. Herbert Robson moved that the question of the adoption of the gas supply be taken into consideration by the Gas and Water Committee, in order to see whether it was expedient to negotiate for the purchase of the gas-works. Mr. W. L. Robertson seconded the motion, and in doing so stated that there was scarcely a corporation who had taken up the gas supply of their town who had not realized profit enough to form a substantial benefit to the inhabitants. A public meeting of the inhabitants of the city, convened by the mayor, in compliance with a numerously signed requisition, was held in the town-hall, on Wednesday evening, the 28th of August, to consider the proposed increase in the charges of the Durham Gas and Water Companies—the former of which had given notice to the consumers of an advance of 20 per cent., and the latter of 10 per cent. The chair was occupied by the mayor. Mr. R. Holdsworth proposed the first resolution, which was as follows:—"That this meeting is of opinion that the present price of gas in Durham is above that of neighbouring towns; that the proposed advance is quite uncalled for, and we therefore think it advisable that some means be adopted to effect it reduction." The motion was seconded by Councillor Shadforth, and carried unanimously. Councillor Richardson proposed—"That a consumers company be formed, with shares at £1 each, half-a-crown to be paid as a deposit on the

allotment of the shares, and the remainder in calls." Mr. W. J. Martin seconded the motion. Councillor Shadforth moved as an amendment—"That it is the opinion of this meeting that the Corporation of Durham, who are large consumers of gas, and who ought to take the initiative in everything affecting the interests of the general public, be requested to make gas for the use of consumers, and that the profits arising therefrom be appropriated to the reduction of the public rates." Mr. S. Holdsworth seconded the amendment. After some discussion, the mayor put the amendment to the meeting, and about 30 hands were held up. The original motion was then put, and about an equal number of hands appearing to be held up, the mayor was unable to decide whether the amendment or the original motion had been carried. He thereupon again took the sense of the meeting, and ultimately declared in favour of Mr. Richardson's motion. Mr. Richardson next moved—"That the water company be requested to look into the purity of their water, as the citizens of Durham were of opinion it was exceedingly impure." Mr. Martin seconded the motion, which was unanimously adopted. A vote of thanks to the mayor having been enthusiastically given by the meeting, the business terminated.

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN AUGUST, 1872.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	17·70	0·055	0·131	0·000	13·7	3·3
West Middlesex	17·13	0·085	0·111	0·003	13·2	3·3
Southwark and Vauxhall	—	—	—	—	—	—
Chelsea	—	—	—	—	—	—
Lambeth	—	—	—	—	—	—
Other Companies.						
Kent	27·47	0·017	0·217	0·000	20·1	5·5
New River	17·10	0·038	0·147	0·000	13·2	2·4
East London	17·20	0·051	0·166	0·001	13·2	3·6

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 119,856,157 gallons; and the number of houses supplied was 497,845. This is at the rate of 36·7 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 26·8 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne. HY. LETHEBY, M.B.

WISBECH WATER-WORKS COMPANY.—The sixteenth ordinary general meeting of the shareholders of the Wisbech Water-Works Company was held on the 15th ult.—Mr. George Dawbarn presiding. The report of the directors stated that the award in the arbitration case between the company and the proprietors of the Setch Brewery had not yet been delivered, and the directors therefore thought it premature to enter into any details relating to the subject. The chairman said that the company started with a more favourable balance this year than they had done previously, last year's balance being £800, this year's £920. This gave them a surplus of £120, which was included in the balance of £489. The report and balance-sheet were adopted, and the seal was affixed to the register of shareholders. The chairman intimated that when they got more thoroughly established they might perhaps then declare half-yearly dividends.

GREENOCK WATER TRUST.—The monthly meeting was held on the 27th ult.—Provost Neill presiding. The superintendent's report stated that "the leakage through the masonry of No. 2 culvert is still increasing, and amounts to 3 cubic feet per minute." Bailie Campbell thought it would be well that some arrangement should be come to whereby this leakage could be stopped, and a settlement be made with the contractor. The provost said that, as the contractor had not yet submitted the necessary certificate that the works were properly finished, it would be well to leave the matter in the hands of Mr. Young's law agents and the clerk of the trust. In answer to a question, the provost said that the trust were not at liberty to run all the water out of this reservoir, as they were bound to keep it full for the millowners on the Gryffe during the summer months. On the motion of the provost, seconded by Bailie Birkmyre, it was agreed that a sum of £20,975 be this year raised, and that the assessment be the same as last year, viz:—1s. per £1 of a domestic rate, and 2d. per £1 of a public rate. It was intended to pay interest out of this sum on the full amount of debt.

WEST SURREY WATER COMPANY.—The half-yearly meeting of this company was held on Saturday, Aug. 31, at the offices, 5, Westminster Chambers—Mr. J. Hook in the chair. The secretary read the report, which showed that 1925 shares had been issued, and £13,378 paid upon them out of the total £25,000 authorized by the company's Act. The chairman, in moving the adoption of the report, said he was able to assure the shareholders that the works were being pushed on by the contractors with great energy in the neighbourhood of Walton, Hersham, and Weybridge, and it was hoped that they would be able to supply part of the inhabitants of the district, with water by Christmas next. About three-quarters of a mile of piping was already laid down, and the company had entered into arrangements for the purchase of land for the construction of a reservoir. Two filter-beds had been deemed sufficient, but land enough was reserved for the construction of two more. It was hoped that by next summer the whole district would be supplied. The entire contract was £23,500, of which £10,000 had been already advanced. When the company was first projected the inhabitants did not come forward as they might have done, or the whole work would have been completed two years ago. The report was at once adopted, and a vote of thanks to the chairman concluded the proceedings.

ROCHESTER AND CHATHAM WATER-WORKS COMPANY.—The half-yearly meeting of the shareholders of this company was held on the 20th ult., Mr. J. Baird in the chair. The directors, in their report, congratulated the shareholders on the satisfactory progress of the company, the receipts for the past half year showing an increase of £146 12s. 8d. over those of the previous one, and of £522 17s. 1d. over those of the corresponding half year of 1871. There had been an excess charged the company of £172 16s. 3d. under the new assessment for rates and taxes, and besides this about £350, a portion of the expense of the two new pumps just finished, had been paid out of the revenue instead of the capital account. A further sum of £800 had been likewise paid during the half year towards the liquidation of preliminary expenses, and it was hoped that the entire amount of these expenses would be discharged in the course of the present half year. The report concluded by recommending a dividend at the rate of 6 per cent. per annum, free of income-tax, for the half year ended June 30, and that £338 16s. 4d., the balance of revenue, be carried forward to next half year's account. The capital account showed that £46,394 had been received, the whole of which had been expended. The revenue account showed that the gross receipts during the past half year had been £4209, leaving, after the payment of all charges, and a further sum of £800 on account of preliminary expenses, an available sum of £1037 to be distributed as profits. The reserve-fund of the company now amounts to £2547. The chairman moved the adoption of the report and balance-sheet, and in doing so said the directors had decided, at the last half-yearly meeting, to introduce new pumps, and to effect additional sinkings for water. In doing this they had experienced great difficulty in lowering the pump headings 20 feet, in consequence of the great quantity of water from the heavy rains. The working of the new pumps was most satisfactory, and the quantity of water they threw up something marvellous, the directors congratulating themselves on the manner in which the firm selected by them had carried out the work. Although the price of iron had increased to such an extent since the contract had been signed the firm did not attempt to budge from their agreement but carried out their work in a most satisfactory manner, although they admitted that if they had to take the work again they would not undertake it under £500 more than what they had taken the contract for. The report was unanimously adopted, and the dividend of 6 per cent. declared. A vote of thanks was then presented to the directors. The chairman, in acknowledging the compliment, said the directors hoped by the next half-yearly meeting to have the whole of the preliminary expenses paid off, and that they would be in a position to give the shareholders a bonus or something else. Unfortunately their assessment had recently been raised very high, and they had now to spend £400 per annum more than previously. They had taken legal advice as to appealing against the increased assessments, but there did not appear to be any way of getting over the matter or the directors would have availed themselves of it. He hoped to live long enough to see the company paying a dividend of 10 per cent. A vote of thanks to the auditors, and the secretary and officials of the company, brought the proceedings to a close.

THE WATER SUPPLY OF LIVERPOOL.—At a meeting of the Liverpool Water-Works Committee, held on Monday, Aug. 26, a discussion took place upon the water supply of the town—a subject which has commenced to attract much attention from the statements which have been made that the water has become very much deteriorated in quality, and that the supply is not sufficient for any emergency. Mr. J. H. Wilson, the chairman of the committee, stated that a number of deep wells, from which a large proportion of the town water had been drawn, had of late years become contaminated by sewage, which had dangerously affected the purity of the water; but, in some cases, the measures taken had remedied the evil. With regard to the main reservoirs at Rivington, these works were designed 25 years ago, since which time Liverpool had nearly doubled its population, so that some measures would have to be taken to increase the supply. A new reservoir was being constructed at Rivington, and would be ready in 18 months hence, and he (the chairman) was satisfied that with that addition, if they could restore the wells to their original state of purity, there would be sufficient water for ten years to come. This course would entail a large expenditure, but it was for the inabitants to say whether they would adopt this or force the corporation to adopt a scheme like that of bringing the water from Bala Lake, at an outlay of a million or a million and a half. At present there was a positive want of 2 million gallons a day on a ten hours supply, and he believed that there was something like £30,000 or £40,000 worth of water absolutely wasted every year. The committee had visited Manchester, and ascertained the system in force there for checking leakage and waste, and they considered it to be very effective and complete. A discussion ensued, in the course of which it was stated that though the reservoirs at Rivington were full to overflowing, Liverpool was on a supply of only seven hours daily. It was ultimately agreed that an amended code of regulations and instructions to the public as to the prevention of waste should be drawn up and submitted to the next meeting.

BRADFORD WATER SUPPLY.—On the 27th ult., at the invitation of the Mayor of Bradford (Mr. M. W. Thompson), the members of the corporation, accompanied by a number of invited guests, were conveyed from Bradford to Oxenhope in three saloon carriages, to witness the turning of the first sod of Leeshaw reservoir by the mayor, and of Leeming reservoir by Alderman Brayshaw, chairman of the Water-Works Committee of the Corporation. These reservoirs are to compensate the millowners on the river Worth and its tributaries, the Bradford Corporation having secured the right to take the water, which, in natural progress, would have flowed down the Worth valley to Keighley. The Leeshaw reservoir will be formed in the valley at Bodkin Bridge, on the Leeshaw beck, a stream which rises on the high lands, having on the south side its watershed to the river Calder, and on the north descending to the river Aire. The water coming in the latter direction is that which the Corporation of Bradford intend to utilise for compensation purposes, and for aiding the high level service to Bradford. A tunnel crosses Thornton Moor to Stubden reservoir, and westward of this a conduit will be found, 4¼ miles in length, to collect the water from the gathering-ground sloping down to the river Worth. This water will be used to fill the Leeshaw and Leeming reservoirs, and the surplus water will pass through the tunnel to Stubden reservoir, to aid in the supply of the high level service to Bradford. As the high level district at its highest point is 850 feet above sea level, the reservoirs are constructed at 1150 feet above the sea level, and the drainage area rises to 1475 feet above the sea. The Bradford Corporation have engaged to supply 48 townships with water, and it is to meet this demand that the works are being extended. The Leeshaw reservoir will cover 20 acres, and its capacity will be 20 million gallons of water. The length of the embankment will be 998 ft. and its greatest height will be 76 feet 6 inches. The Leeming reservoir is of the same capacity. The length of the embankment will be 987 feet and the height 97 feet. Leeshaw reservoir, which is situated in the picturesque country to the west of Oxenhope, is not yet commenced, but Leeming, which lies in the valley below Bradshaw Head, is well advanced. The works have been let to Messrs. Crabtree Brothers and Robert Sugden, of Leeming and Oxenhope. They will cost about £60,000, and are to be completed in two years. The company walked from Oxenhope to Leeshaw, where the first sod was turned by the mayor (Mr. Thompson) amid loud applause. Thence they journeyed over the hills and dales to Leeming, where a similar ceremony was gone through by Ald. Brayshaw, who dug the sods, filled the barrow, wheeled it along the planks, and tipped it in workmanlike style. Both gentlemen were presented with spades, made specially for the occasion, the handles being of ebony, mounted with silver, and bearing an inscription, and the "mouths" of the spades were made of steel. The company then proceeded to the Baptist school at Leeming, where an elegant collation was spread by Mr. J. Crowther, of the New Inn, Bradford. The mayor occupied the chair. After the loyal toasts had been duly honoured, others followed, the speakers being the mayor, Alderman J. Dawson, Councillor Whitehead, Mr. H. Brown, Aldermen Brayshaw, Storey, and Mark Dawson, the town-clerk (Mr. M'Gowen), the borough surveyor and water-works manager (Mr. Gott), Councillor Hill, Rev. Mr. Grant, vicar of Oxenhope, and Councillor Anderson.

A vote of thanks was given to the managers of the school for the use of the building. The company, who returned to Bradford by the 4.40 p.m. train from Oxenhope, heartily enjoyed their excursion in the hilly region where the new reservoirs are to be formed. £1,000,000 of money has been expended on the Bradford Water-Works, and this was the first time on which the Bradford Corporation has had any official display in connexion with these important works.

Register of New Patents.

2511.—JAMES VERITY, of No. 1, Carlton Road, Kentish Town, in the co. of Middlesex, for "*Improvements in the construction of chimneys for gas-burners and oil and other lamps, and in reflectors and protectors for the same.*" Patent dated Sept. 23, 1871.

This invention consists, firstly, in making chimneys for gas burners and lamps of thin sheets of mica fixed into a metal frame without the use of pins, rivets, clips, screws, or solder, and made of any form or shape desired. Secondly. Making reflectors for such chimneys of sheets of calcined mica, and placing them between two sheets of the ordinary mica forming the chimney, or facing with ordinary mica the calcined mica, and putting a metal frame round it, so that the reflector may be removed at pleasure. Thirdly. Making protectors of mica formed in the shape of a cone to be used in conjunction with the chimney.

2512.—JOHN BELL MUSCHAMP, of Kensington, in the co. of Middlesex, paper maker, for "*A new or improved liquid meter.*" Provisional protection only obtained. Dated Sept. 23, 1871.

The novelty of this invention consists in the employment of a buoyant revolving valve or disc supported on a vertical spindle, and so arranged as to work against the under side of a fixed plate, against which it is maintained by its own buoyant properties. This valve is provided with cavities formed radially around the periphery of its upper surface, and receives its rotary motion from one or more streams of the liquid to be measured passing through the said fixed plate in a diagonal direction from a chamber above, which act on the vertical sides of the said cavities; and the vertical spindle of the said revolving disc being provided with suitable counting and recording mechanism, the quantity of liquid passing through the meter may thus be registered.

2526.—CHARLES WALL, of Birmingham, in the co. of Warwick, manufacturer, for "*A new, or improved portable air-tight holder or vessel, to be used for sanitary and other similar purposes.*" Provisional protection only obtained. Dated Sept. 25, 1871.

The novelty of this invention consists in constructing a holder or receptacle of any convenient form, but by preference circular at the top, to which vessel or holder a cover is applied, with a washer of india-rubber on its under side, and when applied comes in contact with an annular projecting rib or flange near the top of the vessel, which is rendered air-tight by a screw or other equivalent means passing through a cross-bar above the cover, and when turned in the right direction places the cover in close contact with the rib before mentioned.

2534.—CHARLES ROBERT MATHEWS, of 52, High Street, Bloomsbury, in the co. of Middlesex, gas engineer and gas lantern and lamp manufacturer, for "*Improvements in apparatus for a safe, speedy, and easy mode in fixing, connecting, and disconnecting gas pendants, brackets, pillars, and ground connexions; also for connecting and supplying gas to railway carriages, especially adapted for outside reflecting lamps.*" Provisional protection only obtained. Dated Sept. 26, 1871.

A cast metal plate is inserted level with the facia, wall, or floor, having two or more slots, with a square or circular hole, containing india-rubber washer or disc, through which the gas is directed, below the slot fastenings. The object is to obtain a very strong, steady, and secure fixing without the use of screws, fly-nuts, or loose fastenings, the washer or disc receiving a regulated pressure, whereby the joint is made sound. The connexion in the plate is further locked and secured by a simple motion attached to the same. The connexion attached to reflecting lamps is similar to the above, with the addition of an invisible tap or slide-valve of great durability and strength, combined with artistic appearance.

2552.—FREDERICK LACEY, of Birmingham, in the co. of Warwick, caster, for "*An improved apparatus for ventilating rooms.*" Provisional protection only obtained. Dated Sept. 28, 1871.

The invention consists substantially in providing two metal tubes of suitable diameter, which are placed in a perpendicular or nearly perpendicular direction, and which said metal tubes are connected at their lower parts by a cross tube. At a proper height in one of the said upright tubes is placed a gas jet, which when the apparatus is desired to be used is lighted, so that the air contained in this tube (which is the "outlet" tube) may be rarefied; and a vacuum being thus created, there will be a constant suction or in-drawing of the surrounding air into the other of the said tubes, which is the "inlet" tube.

2567.—CHARLES DE CHASTELAIN, of Caprera Lodge, Wandsworth, in the co. of Surrey, gentleman, for "*Improvements in the mode of and apparatus for intercepting, collecting, and filtering fœcal and sewage or drainage matters.*" Patent dated Sept. 29, 1871.

The invention consists in the intercepting, collection, and treatment by filtration of the contents of house drains, sewers, and other receptacles of fœcal and sewage or drainage matter by an apparatus which shall arrest the solid matters from passing away from it, and filter the liquid in passing through it, so as that the discharge as passed off shall be comparatively inoffensive.

2574.—THOMAS GEORGE GREENSTREET, surveyor, 142, New Kent Road, in the co. of Surrey, for "*An improved apparatus or machine for cleansing streets and thoroughfares.*" Provisional protection only obtained. Dated Sept. 29, 1871.

This invention consists in attaching two or more strong springs underneath the body of a cart or vehicle of any shape or description whatsoever, and connecting with the upper ends of such springs a long broom composed of india-rubber, or any suitable material. The springs are worked by a lever connected with the cart in such a manner that the broom can be forced into contact with the surface of the road, street, or way, and raised therefrom at pleasure.

2578.—MATTHEW WILSON, of Hills Place, Oxford Street, in the co. of Middlesex, for "*Improvements in stench traps.*" Provisional protection only obtained. Dated Sept. 22, 1871.

This improved stench trap consists of a short length of flexible tube suspended or fixed at one end within the trap casing or in a drain or pipe. This flexible tube has a tendency to coil or twist so as to close the passage, but opens for passing any liquid therethrough.

2599.—WILLIAM ROBERT LAKE, of the firm of Hazeltine, Lake, and Co., Southampton Buildings, London, patent agents, for "*Improvements in the manufacture of inflammable gas, and in apparatus employed therefor.*" A communication. (Complete specification.) Patent dated Oct. 2, 1871.

In this invention a bench of three retorts is employed. One of the retorts is set in a horizontal position, the other two vertical. Ordinary fuel as well as some other substances containing hydrogen and carbon are subjected to distillation, out of contact with the atmosphere, and such of the distillates as contain the heat-producing elements that are condensable and non-inflammable are decomposed and converted into inflammable gases. The two vertical retorts are filled with small pieces of fire-brick, and are kept at a white heat. The crude fuel is first placed in the receiving retort. The volatile products are conveyed directly into the vertical retorts, and by this means the volatile hydrocarbons form a variety of gases, which pass from this retort through the connecting-pipe into and down through the other vertical retort, where they again deposit a portion of their carbon, and are converted into permanent inflammable gases. Compounds, very annoying to the manufacturers of ordinary illuminating gas, are given off from coal by distillation with other products, and become deposited in the stand-pipes. By this invention, these compounds are wholly utilized, as well as the product known as coal tar, by conversion into permanent inflammable gases.

2606.—WILLIAM THOMAS WALKER, of 7, Holly Terrace, Highgate, in the co. of Middlesex, for "*Improvements in apparatus used in gas-works for cleansing and purifying gas from ammonia and other impurities.*" Patent dated Oct. 3, 1871.

These improvements have for their object the purification of coal gas from ammonia and other impurities, for which purpose scrubbers have been heretofore used in gas-works, consisting of a circular vessel filled with coke, supported upon gratings through which water is showered down in opposition to the gas passing up, and, meeting the descending liquid, becomes washed, the water being supplied by revolving syphon tubes on to a circular framed wheel charged with birchwood revolving horizontally. The objects of this invention are to improve the efficacy, working action, and purifying power of scrubbers, and greatly reduce their cost. The height heretofore of scrubbers has generally been about 20 to 25 feet. By experiments it has been discovered that by greatly increasing their height (say to 60 or 70 feet, the bottom being made concave instead of flat), their purifying power is improved, thereby enabling the quantity of water required to be considerably reduced, and a highly concentrated ammoniacal solution is obtained at the lower part of the scrubber, which is found to act as a solvent for bisulphide of carbon and other impurities, which it has hitherto been found impracticable to remove from coal gas.

Heretofore it has been customary to build a water-tower or other building at a great expense, sufficiently high to support a water-tank to feed the tops of the scrubbers; but by this invention the expense of these water-towers or other buildings is obviated by converting the scrubbers themselves into water-towers, and making them so as to carry their own water-service tanks, thus effecting a great saving in money and space, and increasing their convenience; and the tops of the scrubbers are covered in with a light building, enclosing the water-tank, pipes, and other machinery to protect them from frost. The air inside the building will be rendered temperate by the warmth of the scrubber itself, instead of being exposed to the weather on the top of an isolated building as heretofore, or it can be heated by steam from a boiler, or waste steam from an engine. The means of working and feeding the revolving horizontal water-spreading arms is also improved and cheapened by means of a water-seal box of novel construction. Where the height at disposal is very limited, one syphon is used to seal the water supply of all the revolving water-spreading arms, which syphon is attached to the side of the scrubber, or placed in any other convenient position, and the revolving water-spreading arms are worked in water-tight stuffing-boxes. The use of leather or gut bands heretofore used is obviated, and gearing, horizontal or vertical, is substituted. Eccentric toothed wheels are employed for causing the arms to travel at a slower speed over the larger surfaces to spread the water equally over every part.

2609.—THOMAS BALL, of Nottingham, gentleman, for "*Improvements in the treatment of ammoniacal liquor and lime resulting from the manufacture and purification of gas in gas-works.*" Provisional protection only obtained. Dated Oct. 3, 1871.

In carrying out these improvements, either the ammoniacal liquor or the lime, is combined with wood sawdust, breeze or spent ashes, coke, dried peat, cocoa-nut fibre, spent tan, or dried clay, or other slightly absorbent or cellular matter in the state of fine particles or powder.

In the treatment of ammoniacal liquor of gas-works, take, say, half a bushel of wood sawdust, and half a bushel of highly dried clay reduced to powder and having well mixed these together by any suitable mill or mixing means, add thereto one pint of sulphuric acid which has been diluted by adding thereto three pints of water. The wood sawdust, clay, and dilute acid are then thoroughly worked together, and when fully combined add thereto, say, three gallons of ammoniacal liquor, and again thoroughly mix the whole together.

In the case of the lime the proportions which have been found to answer are one bushel of dried peat, or half a bushel of wood sawdust, and half a bushel of finely dried clay, and one pint of sulphuric acid diluted in four pints of water, and after these have been mixed in a mill, or by other means, and allowed to remain for some time, say 24 hours, they are mixed with, say, two bushels of the lime taken direct from the purifiers, and thoroughly combined by the aid of any ordinary mill or mixing means. The proportions referred to may, however, be varied. In the case of the other matters, as breeze or spent ashes, coke, cocoa-nut fibre, spent tan referred to, a similar treatment is adopted. The products thus obtained are particularly adapted for use as manures.

2613.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in water-meters.*" A communication. Patent dated Oct. 3, 1871.

This invention relates to reciprocating piston water-meters, two cylinders, open at one end and closed at the other, being employed, placed in the same axial line with their open ends facing each other, and having hollow pistons for the sake of lightness working therein, such pistons being rigidly connected together by a piston-rod having tappets for working a tipping lever, which actuates the slide-valve. The whole of the mechanism is enclosed within a water-tight casing, so that no stuffing-boxes are required; the counting mechanism is actuated by a reciprocating rack, and registers only at each alternate movement, the contents of both the measuring cylinders being registered at one time.

2626.—WILLIAM IRLAM ELLIS, of Murray Street, Higher Broughton, Manchester in the co. of Lancaster, engineer, for "*Improvements in machinery for forcing and exhausting air or other gases.*" Patent dated Oct. 4, 1871.

This invention consists—1. In the construction of blowing machines or forcing apparatus for air or gases. 2. In the construction of apparatus for the exhaustion or exhaustion and forcing simultaneously or alternately of air or other gases, in which one cylinder is used revolving inside a larger, fixed eccentrically with the smaller one with two or more fan blades or vanes, which, whilst revolving round a shaft concentric with the outer cylinder, are driven by the inner one. 3. In the construction of the above described apparatus with the motion of the outer extremities of the fan blades controlled by a wheel or other similar arrangement. 4. In making the inner cylinders of the above described machines with openings for the supply of air or gas from within to counteract the centrifugal force of the air or gas. 5. In the construction of any of the above described machines with its own separate steam-engine or other motive power. 6. In the construction of any of the above described machines with the delivery increased by the method of induced currents.

2355.—ALFRED HENRY STILL and DENNY LANE, both of the city of Cork, Ireland, for "*Improvements in the manufacture of illuminating gas.*" Patent dated Oct. 6, 1871.

The objects of this invention are to reconvert ordinary breeze produced during the process of gas manufacture into coke, and to raise the illuminating power of coal gas to a high standard. For this purpose the peculiar and economical process of mixing breeze when in a heated state with gas tar, and carbonising the mixture in the retorts usually used in gas-works, as hereafter described, is employed. The breeze should be screened or pulverized, and when so prepared, is heated on the retort benches or otherwise to a temperature of not less than 80° Fahrenheit. The temperature of the tar is raised to not more than about 200° Fahrenheit. This can be most conveniently done in a vessel consisting of a strong iron cylinder, through the sides of which pass the ends of a coil of pipe placed within the vessel and heated by steam. If, as in most cases, it is desirable to lift the heated tar to any height, it will be sufficient to provide a pipe opening near the bottom of the heating vessel. When the vessel is sufficiently heated, the pressure of the vapours produced by the more volatile portions of the tar acting on the surface of the tar will be sufficient to raise the heated tar through the last-mentioned pipe to a considerable height, dependent upon the heat of the vessel and the elastic force of the vapour. The tar and breeze thus heated are to be mixed together, with or without a small proportion (say one-tenth) of coal dust, and manipulated in a machine similar to a small pug mill, until the hot breeze will have absorbed the proportion of 60 to 150 gallons of the hot tar to one ton of the heated breeze or coal and breeze.

The compound, after having been passed through and removed from the mixing machine, is improved by being allowed to rest heaped up for two or three days under cover. It may then be fairly and sufficiently mixed by being thrown over the ordinary coal on the retort-house floor, to be carbonized with the coal at the rate of one part mixture to five parts coal, more or less, as the illuminating power of the gas may be required to be higher or lower. Each retort should receive its proportion of the mixture. It is not essential that the tar should be heated if the breeze be made sufficiently hot (say 200° to 500° Fahrenheit) to ensure a proper temperature in the mixture. In place of using crude tar, the distilled product known as creosote is sometimes employed. A good result may be obtained when creosote is mixed with the gas tar employed, in the proportion of two parts of creosote to from four to ten parts of tar.

It is found in practice that the process described diminishes the quantity of cannel required, or precludes the necessity for using it at all, to raise the illuminating power of the gas to be supplied to the public, so as to meet the required standards; but if cannel or cannel nuts be employed, the breeze is added to it before the addition of the tar. The use of cannel or cannel nuts in this manner will not interfere with the production of good coherent coke.

2359.—JAMES BURROW, of the Hampton Vicarage, in the co. of Middlesex, master of arts, for "*Improvements in treating sewage and other matters.*" Patent dated Oct. 7, 1871.

This invention relates to the employment of a mixture of sulphate of iron and lime or some other re-agent in sewage tanks or receptacles for causing the solids to deposit themselves. The deposit and the effluent water can afterwards be used for commercial purposes.

2360.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, major-general, C.B., for "*Improvements in the treatment of the refuse lime resulting from the purification of coal gas.*" Provisional protection only obtained. Dated Oct. 7, 1871.

According to this invention, gas lime is calcined in the presence of air so as to expel the carbonic acid and oxidize the sulphur compounds. The resulting material will consist chiefly of quick lime and sulphate of lime, and their separation is effected by taking advantage of the different specific gravities of these substances.

2362.—JOHN FREDERICK GUSTAVE KROMSCHROEDER, of Gloucester Street, Regent's Park, in the co. of Middlesex, engineer, for "*Improvements in apparatus for generating inflammable gas or vapour for heating and lighting purposes.*" Patent dated Oct. 7, 1871.

This invention has for its object improvements in apparatus for generating inflammable gas or vapour for heating and lighting purposes. In the specification of a former patent granted to the present inventor on Oct. 1, 1863 (No. 3069), was described apparatus for generating inflammable gas or vapour, by passing a stream of air through wool or other absorbent material saturated with liquid hydrocarbon. The present invention has for its object to improve such arrangements of apparatus for producing inflammable gas. For this purpose is employed by preference an arrangement of air-forcing apparatus, driven by clock-work, such as is described in the specification before mentioned, and around the casing containing the air-forcing apparatus an outer casing is formed. The space between the two is made into a reservoir for containing a supply of liquid hydrocarbon. The vaporizing chamber is below the chamber containing the air-forcing apparatus, as in the arrangement described in the before-mentioned specification, and in order to maintain an equal supply of hydrocarbon in the vaporizing chamber, it is supplied from the reservoir by a bird-fountain arrangement. For this purpose there is an inlet-pipe passing from the lower part of the reservoir into the vaporizing chamber, and also an air-pipe passing from the vaporizing chamber to the top of the reservoir. When the level of the liquid is below the open end of the air-pipe in the vaporizing chamber, air passes from such chamber into the reservoir, and allows liquids to flow therefrom into the vaporizing chamber, until the level of the liquid therein rises above the bottom of the air-pipe. In place also of admitting a stream of air at one side of the vaporizing chamber and simply allowing it to permeate through absorbent material directly to the opposite side of the chamber, the vaporizing chamber is divided by partitions or divisions so as to form it into a circuitous channel, which is to contain wool, or absorbent material. It is preferred that the vaporizing chamber should be divided by a spirally formed division, and the current of air admitted to the centre of such vaporizing chamber and drawn off at the circumference after it has permeated through wool or absorbent material contained therein. A more complete saturation of the air with inflammable vapour is thus obtained, and an inflammable gas or vapour of far higher illuminating power is obtained. The vaporizing chamber is also surrounded with a thick jacket or coating of non-conducting material to protect it from the influence of extreme cold, which otherwise would affect prejudicially the working of the apparatus, and diminish the illuminating power of the light. The non-conducting material will preserve the generator at a uniform temperature, whereby the gas produced will maintain a constant illuminating power. When the apparatus is to be used on board ship it is suspended on gimbals, so as to maintain it in a horizontal position, or nearly so, and thereby prevent the hydrocarbon in the vaporizing chamber from splashing about or flowing from one side to another, and so producing irregularity in the working of the apparatus, and for this purpose it is best to connect two opposite sides of the apparatus by axes or ball-and-socket joints, with a frame which itself is suspended by a ball-and-socket joint at its upper end.

APPLICATIONS FOR LETTERS PATENT.

2416.—SAMUEL CHANDLER, sen., SAMUEL CHANDLER, jun., and JOSIAH CHANDLER, of London Road, Southwark, in the co. of Surrey, gas engineers, for "*Improvements in dip-pipes for regulating the seal in hydraulic mains used in the manufacture of gas.*" (Complete specification.) Aug. 14, 1872.

2421.—JOSEPH JOSIAH BLACKHAM, of Birmingham, in the co. of Warwick, manufacturer, for "*Improvements in gas-stoves.*" Aug. 14, 1872.

2428.—CHARLES HENRY CAWSE, of Islington, in the co. of Middlesex, for "*Improved apparatus for regulating the supply of water to water-closets and other vessels.*" Aug. 15, 1872.

2452.—EDMUND BALLER, of Birmingham, in the co. of Warwick, for "*Improvements in cocks or valves.*" Aug. 16, 1872.

2453.—STEPHEN HENRY EMMENS, of 8, Old Jewry, in the City of London, scientific referee, for "*Improvements in apparatus for producing heat and light.*" Aug. 16, 1872.

2459.—GEORGE POMEROY DODGE, of 79, Upper Thames Street, in the City of London, india-rubber manufacturer, for "*An improved cement for the joints of pipes and other apparatus for containing or conducting steam, water, or other fluids.*" Aug. 17, 1872.

2460.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improved apparatus for automatically igniting gas.*" A communication. Aug. 19, 1872.

2469.—WALTER CHARLES CHURCH, of 39, Lombard Street, in the City of London, consulting engineer, for "*Improvements in steam and hydraulic engines, partly applicable to steam-hammers, hydraulic rams and pumps, and to valves for regulating the flow of fluids under pressure.*" Aug. 19, 1872.

2487.—WILLIAM YOUNG, manager of the Chemical Works, Magdalen Bridge, PETER BRASH, of Leith, soap, candle, and oil manufacturer, and ANDREW SCOTT, manager of the Musselburgh Gas-Works, Musselburgh, all in the co. of Mid Lothian, for "*Improvements in the destructive distillation of coal, shale, and other bituminous substances for the production of illuminating gas and of oils.*" Aug. 21, 1872.

2496.—MILLINGTON HENRY SYNGE, of the United Service Club, Pall Mall, in the co. of Middlesex, colonel Royal Engineers, for "*Improvements in deodorizing apparatus.*" Aug. 22, 1872.

2504.—WILLIAM MORRIS, of the Kent Water-Works, Deptford, in the co. of Kent, engineer, for "*Improvements in making connexions with water-mains under pressure.*" Aug. 23, 1872.

2510.—WILLIAM VINCENT, of Arborfield, in the co. of Berks, machinist, for "*Improvements in apparatus for manufacturing gas.*" Aug. 23, 1872.

2514.—HENRY ALDER, of Edinburgh, N.B., for "*Improvements in the construction of dry meters.*" Aug. 24, 1872.

2528.—JOHN FREDERICK PARKER, of Birmingham, in the co. of Warwick, chemist, and ARTHUR WADE, of Birmingham aforesaid, stockbroker, for "*Improvements in the manufacture from coal and petroleum of hydrocarbon gas, or gas for illuminating and heating.*" Aug. 26, 1872.

2538.—HENRY YOUNG DARRACOTT SCOTT, of Ealing, in the co. of Middlesex, major-general, C.B., for "*Improvements in the treatment of sewage, and in the preparation of manures therefrom.*" Aug. 26, 1872.

2542.—WILLIAM WILLIAMS BOX, of the Crayford Gas-Works, in the co. of Kent, for "*Improvements in apparatus used in the manufacture of gas.*" Aug. 27, 1872.

2569.—BALTHASAR WILHELM GERLAND, Ph.D., of Macclesfield, in the co. of Chester, consulting chemist, and EDWARD JOHNSON, of Belle Vue Lodge, Dartmouth Park, near Sydenham, in the co. of Kent, for "*Improvements in the manufacture of sanitary charcoal and the application thereof to the treatment of sewage.*" Aug. 29, 1872.

GRANTS OF PROVISIONAL PROTECTION.

2126.—RICHARD JAMES JOHNSON, of 10, Victoria Road, Hatcham, in the co. of Surrey, builder, for "*An improved method of sewer ventilation, and in apparatus therefor.*" July 15, 1872.

2292.—ALFRED TYLOR, of 2, Newgate Street, in the City of London, brassfounder, for "*Improvements in apparatus and arrangements for the water supply of water-closets and baths, and preventing waste, applicable also in whole or in part for controlling, regulating, and arresting the flow of liquids and fluids, and preventing waste.*" July 31, 1872.

2296.—GEORGE HASELTINE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in machines for the manufacture of gas.*" A communication. Aug. 1, 1872.

2324.—WILLIAM EDWARD GEDGE, of 11, Wellington Street, Strand, in the co. of Middlesex, patent agent, for "*An improved portable pump.*" A communication. Aug. 3, 1872.

2335.—GEORGE BRAY, of Leeds, in the co. of York, enamel gas-burner manufacturer, for "*Improvements in gas-burners.*" Aug. 6, 1872.

2359.—JOHN OLDROYD, of Leeds, in the co. of York, general machinist, for "*Improvements in the construction and working of hydraulic engines.*" Aug. 8, 1872.

2421.—JOSEPH JOSIAH BLACKHAM, of Birmingham, in the co. of Warwick, manufacturer, for "*Improvements in gas-stoves.*" Aug. 14, 1872.

2428.—CHARLES HENRY CAWSE, of Islington, in the co. of Middlesex, for "*Improved apparatus for regulating the supply of water to water-closets and other vessels.*" Aug. 15, 1872.

2452.—EDMUND BALLER, of Birmingham, in the co. of Warwick, for "*Improvements in cocks or valves,*" Aug. 16, 1872.

2453.—STEPHEN HENRY EMMENS, of 8, Old Jewry, in the City of London, scientific referee, for "*Improvements in apparatus for producing heat and light.*" Aug. 16, 1872.

2459.—GEORGE POMEROY DODGE, of 79, Upper Thames Street, in the City of London, india-rubber manufacturer, for "*An improved cement for the joints of pipes and other apparatus for containing or conducting steam, water, or other fluids.*" Aug. 17, 1872.

2487.—WILLIAM YOUNG, manager of the Chemical Works, Magdalen Bridge, PETER BRASH, of Leith, soap, candle, and oil manufacturer, and ANDREW SCOTT, manager of the Musselburgh Gas-Works, Musselburgh, all in the co. of Mid Lothian, N.B., for "*Improvements in the destructive distillation of coal, shale, and other bituminous substances for the production of illuminating gas and of oils.*" Aug. 21, 1872.

INVENTION PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF A COMPLETE SPECIFICATION.

2416.—SAMUEL CHANDLER, sen., SAMUEL CHANDLER, jun., and JOSIAH CHANDLER, of London Road, Southwark, in the co. of Surrey, gas engineers, for "*Improvements in dip-pipes for regulating the seal in hydraulic mains used in the manufacture of gas.*" Aug. 14, 1872.

NOTICES TO PROCEED.

883.—JOHN BELL MUSCHAMP, of Kensington, in the co. of Middlesex, paper maker, for "*A new or improved liquid-meter.*" March 23, 1872.

924.—JOHN WOLSTENHOLME, of Radcliffe Bridge, in the co. of Lancaster, engineer, for "*Improvements in steam pumping-engines.*" March 27, 1872.

954.—VINCENT CARATTI, of Belle Vue, Pubrose Road, Brixton, in the co. of Surrey, professor of chemistry, and SAMUEL KING CHURCH, of Fenchurch Street, in the City of London, for "*Improvements in heating and in generating hydrogen for that purpose.*" March 30, 1872.

955.—WILLIAM WELDON SYMINGTON, of Colne Valley Iron-Works, Halstead, in the co. of Essex, engineer, for "*Apparatus for measuring the flow of sewage, and regulating the flow of liquid mixtures used in the purification and deodorization of such sewage, which apparatus is also applicable to other similar purposes.*" March 30, 1872.

963.—JEAN JOSEPH FÉLIX MANENT, of Villefranche, Département de la Haute-Garonne, in the republic of France, now of 60, Boulevart de Strasbourg, Paris, civil engineer, for "*Improvements in pumps.*" April 2, 1872.

966.—JOSEPH RODNEY CROSKEY, of 43, Portsdown Road, Maida Hill, London, for "*An improved system or process for making asphaltic or bituminous pavements.*" April 2, 1872.

977.—WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., of Southampton Buildings, London, patent agents, for "*Improvements in apparatus to be used in combination with a gas-burner for concentrating the light of the same.*" A communication. April 3, 1872.

983.—JOSEPH FRANÇOIS MARIE RIGOD, of 23, Boulevard de Strasbourg, Paris, for "*An improved apparatus for carburetting air.*" April 3, 1872.

989.—JOHN CARRINGTON SELLARS, of Birkenhead, in the co. of Chester, manufacturing chemist, for "*Improvements in obtaining hydrocarbon liquid gas for illuminating and heating purposes, and coke.*" April 4, 1872.

1015.—JOHN RICHARDSON WIGHAM, of Albany House, Monkstown, in the co. of Dublin, Ireland, for "*Improvements in illuminating lighthouses, beacons, harbour lights, and light-ships.*" April 5, 1872.

1022.—JOHN WALTER SMITH, of Oxton, in the co. of Chester, civil engineer, for "*An improvement in the ventilation of sewers and drains.*" April 6, 1872.

1050.—SAMUEL BENNETT, of Trafford Street, Gaythorn, Manchester, brassfounder and coppersmith, for "*Improvements in construction and fixing of cocks or valves for high or low pressure.*" April 9, 1872.

1065.—LEON ANTOINE BADIN, of 9, New Ormond Street, in the co. of Middlesex, civil engineer, for "*A new or improved method of deodorizing human excrementitious matters, and of its manufacture into farm manure, suitable for all descriptions of agricultural purposes and to all localities.*" April 11, 1872.

1073.—JOHN BELL, jun., and THOMAS BELL, both of Wishaw, in the co. of Lanark, N.B., engineers, for "*Improvements in apparatus for discharging horizontal retorts.*" April 11, 1872.

1166.—PHILIPPE ROSIER, of 82, Boulevard Sébastopol, Paris, France, for "*Improvements in apparatus for emptying or exhausting the conduit or supply-pipes of cisterns and similar structures, as a protection from frost or other damage.*" April 19, 1872.

1219.—ARTHUR PAGET, of Loughborough, in the co. of Leicester, for "*Improvements in apparatus for raising, propelling, and distributing water and other liquids.*" April 24, 1872.

2015.—SAMUEL JONES PAYNE, of Charlton, in the co. of Kent, fire-brick maker, for "*An improvement in the manufacture of fire-bricks, crucibles, retorts, and other fireware goods.*" July 3, 1872.

2045.—WALTER WILLIAM TONKIN, of 221, Brixton Road, London, engineer, for "*Improvements in the means of actuating the valves of engines, pumps, or liquid-meters.*" July 6, 1872.

2194—HENRY SUTCLIFFE and WRIGHT SUTCLIFFE, of Halifax, in the co. of York, sanitary engineers, for "*Improvements in moulding or constructing stench-traps or syphon-pipes.*" July 23, 1872.

2227.—MILLINGTON HENRY SYNGE, of the United Service Club, Pall Mall, in the co. of Middlesex, colonel, Royal Engineers, for "*Improvements in deodorizing apparatus.*" July 25, 1872.

2279.—ISAAC BROWN, of Elm Croft Grange, Edinburgh, in the co. of Mid Lothian, N.B., for "*Improvements in the treatment of sewage and in the manufacturing of manures.*" July 30, 1872.

2283.—BENJAMIN JOSEPH BARNARD MILLS, of the firm of Harris and Mills, of 35, Southampton Buildings, in the co. of Middlesex, patent agent, for "*Certain improvements in rotary engines and pumps.*" A communication. July 30, 1872.

2303.—EDWARD GREGSON BANNER, of 11, Billiter Square, in the City of London, for "*Improvements in traps for preventing the passage of noxious gases from sewers or drains through pipes communicating therewith.*" Aug. 1, 1872.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2111.—JAMES BILLINGS, "*Improvements in ventilators.*" Aug. 16, 1865.

2128.—NICHOLAS CHARLES SZERELMEY, "*Improvements in the manufacture of paper boards and pipes.*" Aug. 17, 1865.

2167.—JOHN NEWTON, "*An improved gully or stench-trap for the prevention of the escape of noxious effluvia from drains or sewers, and for preventing the ingress of sand or other solid matters into the same.*" Aug. 23, 1865.

Price Current.

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign.—*	Per Keel.
Chatham and Rochester	8s. 0d	Barcelona	£23 6s
Cork	9 3	Bordeaux	9 5
Dover, Folkestone, & Ramsgate	7 6	Boulogne and Calais	8 5
Dublin	8 9	Cadiz	11 18
Exeter Quay	8 9	Cronstadt	12 10
Ipswich	6 6	Copenhagen	10 5
London (from Leith)	—	Genoa	20 5
London (Pool)	7 3	Hamburg	9 0
Lowestoft and Yarmouth	6 0	Havre de Grace	10 10
Portsmouth & Southampton	7 0	Leghorn	£23 10s. to 24 0
Plymouth	7 6	Lisbon	—
Shoreham	6 0	Rotterdam	10 10
Whitstable	7 0	Stettin	12 0
Weymouth	7 6	Trieste	22 10
		Venice	25 0

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	20 – 22
8000	20	Bahia (Limited)	20 0 0	3 0 0	11¼ – 12½
1000	20	Do., preference	20 0 0	10 0 0	22 – 23
750	20	Do., do., redeemable	20 0 0	10 0 0	21 – 23
40000	5	Bombay (Limited)	5 0 0	6 15 0	6 – 6¼
10000	5	Do., third issue	4 0 0	6 15 0	3¾ – 4 pm.
10000	20	British (Limited), (Norwich, Hull, Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	34 – 36
7500	20	Cagliari (Limited)	20 0 0	7 0 0	19 – 20
120000	10	*Chartered* A shares	10 0 0	10 0 0	15¾ – 16¼
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	7 – 7¼
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	12¾ – 13¼
20000	10	Do., 5 per cent. preference, second issue	8 0 0	5 0 0	2¾ – 3¼ pm.
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19 – 20
12000	25	Do., D shares	25 0 0	10 0 0	49 – 50
17490	100	*Commercial*	100 0 0	10 0 0	165 – 167
20000	20	Continental Union	20 0 0	8 0 0	22 – 24
10000	20	Do., new	10 0 0	8 0 0	11¾ – 12¼ pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	23 – 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16 – 17
5000	10	Do., preference	10 0 0	6 0 0	11¾ – 12
6624	10	Do., new shares	10 0 0	7 0 0	13¾ – 14¼
3376	10	Do.	1 0 0	7 0 0	1 – 1¼ pm.
23406	10	European (Limited)	10 0 0	8 0 0	15 – 16
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	8 0 0	2¾ – 3 pm.
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	12¾ – 13¼
1560000	100	*Imperial*	100 0 0	10 0 0	163 – 166
26000	12½	Do., new shares	12 10 0	7 0 0	15¾ – 16¼
25000	12½	Do., new shares, 1870	12 10 0	7 0 0	15¾ – 16¼
1300	100	Do., bonds	£100	10 0 0	195 – 200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	9 2 6	65 – 67
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	66 – 68
3000	10	Do.	10 0 0	5 0 0	7¼ – 8¼
3000	20	Do.	20 0 0	7 10 0	24¾ – 25¾
230000	Sk.	*London*	100 0 0	10 0 0	163 – 166
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 – 120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18731	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
8000	10	Nictheroy, Brazil (Limited)	10 0 0		1¼ – 1 dis.
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	3¾ – 4¼
6000	5	Do., preference	5 0 0	7 0 0	5¾ – 6¼
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2¾ – 3
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7¾ – 7¾
30000	5	Do., new shares	2 10 0	9 0 0	1¼ – 1½ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 – 2¼
17500	10	Pará (Limited)	10 0 0	6 0 0	10 – 10½
27000	20	*Phœniz*	20 0 0	10 0 0	33¾ – 34¼
3600000*l.*	100	Do., new	45 0 0	7 10 0	14 – 16 pm.
1440000*l.*	Sk.	Do.	100 0 0	5 0 0	69 – 71
5000	20	*Ratcliff*	20 0 0	10 0 0	33 – 35
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	35 – 37
7359	5	Singapore (Limited)	5 0 0	7 0 0	5 – 5¼
2000	5	Do., preference	5 0 0	7 10 0	5¾ – 6
1500	32½	Shanghai	32 10 0	12 0 0	
4000	50	*South Metropolitan*	50 0 0	10 0 0	88 – 90
4000	12½	Do.	12 10 0	10 0 0	22 – 24
20000	12½	Do., new shares	2 10 0	10 0 0	4 – 5 pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16 – 17
10000	10	Do., new	6 0 0	10 0 0	11¾ – 12¼
9000	4	United General (Limerick)	4 0 0	5 0 0	3 – 3¼
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	13 – 14
1500	10	Do.	10 0 0	7 10 0	7¼ – 8
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
40000	10	Western (Limited) A, B, & C shares	10 0 0	10 0 0	15 – 16
20000	10	Do., D shares	1 0 0	10 0 0	3 – 3¼ pm.
16000	5	*West Ham*	5 0 0	9 0 0	7¼ – 7½
10000	5	Do., new shares	1 0 0	9 0 0	1¼ – 1½
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

TURNER & ALLEN,

201, UPPER THAMES STREET,

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GAS & WATER ENGINEERS.

CONTRACTORS FOR THE SUPPLY OF

LAMP COLUMNS, LANTERNS, FOUNTAINS, PIPES, &c.,

TO

GAS, WATER, & RAILWAY COMPANIES, LOCAL BOARDS, SHIPPERS, &c.

Complete Pattern and Price Book, 3s. 6d. post free.

DUKE OF HAMILTON'S
LESMAHAGOW GAS COAL.

LESSEES:

LESMAHAGOW AND LONGLEE COAL COMPANY,

Office—5, DIXON STREET, GLASGOW.

Works—BLACKWOOD & SOUTHFIELD, LESMAHAGOW

English and Foreign Agents:

JAMES MILLER, SON, & CO.,

1, GREAT ST. HELEN'S, LONDON, E.C.,

AND

75, UNION STREET, GLASGOW.

FIG. 213.

GWYNNE & COMPANY,

HYDRAULIC, MECHANICAL, & GAS ENGINEERS,

ESSEX STREET WORKS, STRAND,

London, W.C.,

SOLE MANUFACTURERS OF

BEALE'S IMPROVED PATENT GAS-EXHAUSTER,

Under the personal superintendence of Mr. BEALE.

REDUCED PRICES AND INCREASED CAPACITY.

Also manufacturers of Improved Hydraulic Regulators, to actuate a steam or gas throttle-valve to suit the make of gas; self-acting bye-pass valves, to move by hand or otherwise; improved stop-valves, with faced flanges, forming the neat adjunct to Exhauster of valve and elbow combined. Exhausters manufactured on the new principle have given the utmost satisfaction, and can be seen working at several large Gas-Works in London. G. & Co. are now engaged in manufacturing the largest Gas-Exhausters in the world, with engines complete.

The Gas-Exhausters may be made with inside or outside bearing, as shown in Figs. 211 and 219.

Fig. 213 shows the Improved Gas-Exhauster attached to, and driven by one of GWYNNE AND CO.'s well-known high-speed Horizontal Steam-Engines, without any intermediate gearing. This arrangement is extremely compact, and is beautifully adapted for small or large Gas-Works, and the foundations and erection are both very simple and inexpensive.

Prices and every information upon application to GWYNNE AND CO. *as above.*

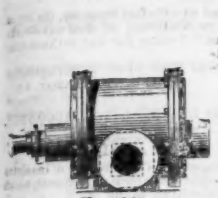


FIG. 211.

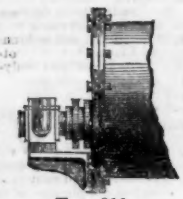


FIG. 219.

DUKE OF HAMILTON'S

LESMAHAGOW GAS COAL.

The superior quality of this well-known Cannel, as wrought by

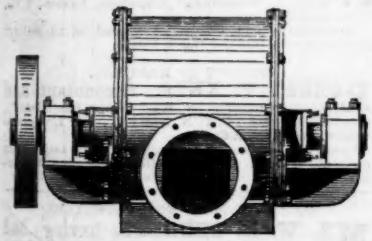
THE NITSHILL AND LESMAHAGOW COAL COMPANY,

Is now generally admitted by all Gas Engineers.

PRICE AND ANALYSIS MAY BE HAD ON APPLICATION TO

JAMES M'KELVIE, HAYMARKET, EDINBURGH.

BEALE'S GAS-EXHAUSTER IMPROVED.



FROM 250 TO 250,000 CUBIC FEET PER HOUR.

Since Mr. BEALE'S retirement, the Oldest Makers are

J. BURTON, SONS, AND WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS.

TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 inches to 30 inches.

SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever,

ROTATORY, TUMBLER, and CAPILLARY WATER DISTRIBUTORS for SCRUBBERS.

EXHAUSTERS from 3000 to 30,000 per hour in stock.

HOLLAND STREET, BLACKFRIARS, LONDON, S.E.,

Between Blackfriars' and Southwark Bridges, South Side.

A new Illustrated Catalogue sent on application.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

TORBANEHILL MINERAL.

For Sale, by Tender,

FOR WHOLE OR PART,

SEVERAL THOUSAND TONS OF THE

Celebrated Torbanehill Mineral,

Saved from the fire at Torbanehill in June last.

The mineral as it at present lies has been examined and analyzed by Dr. WILLIAM WALLACE, Analytical Chemist, Glasgow, who says:

"Very great care was employed to obtain reliable average samples, and the results show that the mineral is not appreciably damaged."

The results of two testings of fair samples of the Coal give 14,880 cubic feet of 43·7 candle gas.

APPLY TO

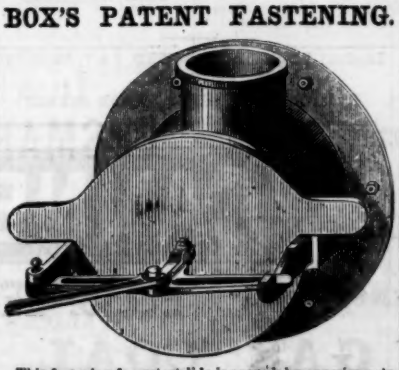
MR. DAVID STEWART,

128, INGRAM STREET, GLASGOW.

STATION-METER for Sale, to pass 6000 feet per hour. Is of the best description, and nearly as good as new (by Laidlaw).

Apply to Shotley Bridge and Consett District Gas Company, Green Street, SHOTLEY BRIDGE.

BOX'S PATENT FASTENING.



This fastening for retort-lids is proved by experience to be the most simple, effective, and durable of any that have ever been used.

The amount of luting is reduced more than one-half.

The lid is rapidly secured and gas saved.

For prices, references, and particulars, apply to THE SOLE MAKERS, BURTON, SONS, AND WALLER, HOLLAND STREET, SOUTHWARK, S.E.

BACK Nos. OF "THE JOURNAL OF GAS LIGHTING" WANTED.

The Publisher requires the following Nos. to complete sets for binding, and will give the full marked prices for clean and perfect copies:—

Nos.	Nos.	Nos.	Nos.	Nos.	Nos.
288	321	427	429	432	476
320	322	428	430	454	498

Address Mr. KING, 11, Bolt Court, FLEET STREET, London, E.C.

ON SALE, two Purifiers 3 ft. 4 in. square by 2 ft. 6 in. deep, with 4-in. connexions, and Clayton's Patent Six-Way Valve.

Apply to CLAYTON, SON, AND CO., Hunslet, LEEDS.

FOR SALE.—A 5-H.P. Vertical Steam-ENGINE, and two 5-H.P. CORNISH STEAM-BOILERS, made by the Reading Ironwork Company; an 8-in. GOVERNOR, with bye-pass and valves complete, by A. Wright and Co.; and a 20,000 cubic feet per hour EXHAUSTER, by Beale, all in good condition, and at present in use. The Engine and Boilers may be had in September, and the Governor at once.

Particulars as to price, &c., may be obtained of Mr. BAKER, Engineer.

Reading Gas-Works, June 15, 1872.

ROBERT MACLAREN and CO., EGLINTON FOUNDRY, GLASGOW,

Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

WANTED, by a young Man, a situation as Meter Fixer, Fitter, Index Taker, Service Layer, &c.
Address J. FEILD, 66, Banner Street, ST. LUKE'S, E.C.

TO STOKERS.

WANTED, a First-hand Stoker. Apply by letter to D., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, in a Wet Gas-Meter Manufactory, an active PERSON who thoroughly understands Gas-Meters (wet and dry), with a view to a Partnership and Succession.
Apply to Mr. FENTON, 1, Commercial Street, LEEDS.

WANTED, by the Advertiser, a situation as COLLECTOR. Gas Company preferred. Has had a good deal of experience in the keeping of gas accounts.
Address L. L., 107, Carlton Road, GOSPEL OAK, N.W.

WANTED, a Clerk for a Gas Office in South America. Must thoroughly understand book-keeping and gas accounts.
Apply by letter, addressed S. A., care of Adam Holden, 49, Church Street, LIVERPOOL.

WANTED, employment as Gas-Fitter, Main and Service Layer, to Inspect or Repair Meters, or as Foreman on Gas-Works. Good testimonials or references.
Six volumes (1858–1863) of JOURNAL OF GAS LIGHTING to be sold at 12s. per volume.
Address M. J., 9, Morledge Street, LEICESTER.

WANTED, a situation abroad by a young MAN as LEAD PIPE MAKER, with first-class practical experience. Capable of constructing a machine. First-class references.
Address W. E., care of James Holloway, 15, Chatsworth Street, Chorlton-upon-Medlock, MANCHESTER.

WANTED, by a thorough practical Man, a re-engagement as Foreman Gas-Fitter, Main-Layer, &c., or would take charge of a small Gas-Work. Well up in the manufacture and distribution of gas in all its branches. First-class references.
Address W. C., Sheppard Street, New Swindon, WILTS.

WANTED, a situation in a Gas-Work, as ASSISTANT MANAGER or DRAUGHTSMAN. Twelve years experience in one of the largest engineering firms in Manchester. First-class testimonials as to character and ability.
Address R. L., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES.

WANTED, by a thoroughly competent hand, an appointment as METER INSPECTOR. The Advertiser thoroughly understands the construction and repair of both wet and dry meters, and would not object to fill up his time either in this department or in connexion with mains and services under the direction of the Engineer of a company.
Address B. T., care of A. H. Wood, Gas Engineer, HASTINGS.

WANTED, a situation as Manager of Gas-Works by the Advertiser, who has conducted the works he is now in, where the make is between 20 and 30 millions, for the last seven years, to his Directors satisfaction. The only reason for quitting his present engagement would be a desire to improve his position. Excellent references given, and no objection to become Assistant Manager or Foreman of large works.
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WANTED, an active and competent Man to undertake the MANAGEMENT and working of the Gas-Works at Caerleon, Monmouthshire. He must understand fitting work, retort-setting, collection of rents, and simple accounts; find the necessary labour, and do all other duties for carrying on the concern efficiently. Salary 30s. a week, with a comfortable house and garden (free of rates), coals, and gas.
The consumption of coals hitherto has been under 200 tons per annum.
Application to be made to Mr. M. M. COPE, Chairman of the Company, Caerleon, MONMOUTHSHIRE.
Sept. 7, 1872.

ANALYSES OF GAS COALS, PHOTOMETRY of GAS, OILS, and CANDLES, and Researches connected with the Chemistry and Photometry of Gas Lighting.
Conducted by DR. WALLACE,
Consulting and Analytical Chemist, and Gas Examiner for the City of Glasgow.
GLASGOW: CHEMICAL LABORATORY, 42, BATH STREET; GAS LABORATORY, 29, ALSTON STREET.

COOKING AND HEATING BY GAS,
BY
MAGNUS OHREN, A.I.C.E.

NEW AND REVISED EDITION.
Prepared for Gas Companies to circulate amongst their gas consumers.
£1 per 100; £3 15s. per 500; or £6 per 1000.
Address, MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

GAS, WATER, AND SANITARY WORKS CONSTRUCTION COMPANY, LIMITED.

A Gentleman possessing practical Engi- neering knowledge, and fully acquainted with Book-keeping, is required to act as SECRETARY to the above Company.
Applications, with qualifications, and stating salary required, to be sent to the Company's Offices, 8, Great Winchester Street Buildings, Old Broad Street, CITY, on or before the 9th day of September inst., endorsed "Application for Secretary."

SURREY CONSUMERS GAS COMPANY.
NOTICE is hereby given that the HALF-YEARLY ORDINARY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the Terminus Hotel, London Bridge, Southwark, on MONDAY, the 7th day of October next, at Three o'clock in the afternoon precisely, to receive the Directors Report for the half year ending the 30th of June last, and to declare a Dividend.
The Books for the Transfer of Shares will be closed on Monday, the 23rd of September, until after the Meeting.
W. P. BODDY, Secretary.
Rotherhithe, Aug. 24, 1872.

PHŒNIX GASLIGHT AND COKE COMPANY.
NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS, holding previous to the 30th of June last £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 25th proximo, at Twelve for One o'clock, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 30th of June last, and on other business.
The Transfer Books will be closed on and after the 11th of September until after the meeting.—By order,
I. A. CROCKENDEN, Secretary.
70, Bankside, London, Aug. 23, 1872.

CRYSTAL PALACE DISTRICT GAS COMPANY.
NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of this Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on THURSDAY, the 26th of September inst., to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare a Dividend, and for general business.
The Chair will be taken at Three o'clock precisely.
By order of the Board,
MAGNUS OHREN, Secretary.
Offices, Lower Sydenham, S.E., Aug. 30, 1872.

COMMERCIAL GAS COMPANY.
NOTICE is hereby given that the next ORDINARY MEETING of the Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on FRIDAY, the 4th day of October next, at Twelve o'clock at noon, to receive the report of the Directors, and to declare a Dividend to the 30th day of June last.
The Books of the Company will be closed for the Transfer of Shares from the 22nd day of September to the 4th day of October now next ensuing.
By the Company's Act of Incorporation, shareholders can inspect the Books of the Company during one fortnight before and one month after the Meeting.
By order of the Board,
GEORGE JAQUES, Secretary.
Stepney, Sept. 7, 1872.

A Provincial Secretary, who holds other offices, West of England, has an opening in his office for an intelligent YOUTH, who may learn as to manufacture, accounts, &c. Premium.
Address A. Z., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE, the remaining lengths of 5-inch MAIN, T and B, thoroughly cleaned, and nearly equal to new. A lowish price will be accepted to clear off the lot.
Apply to T. H. BOUTELL, Manager, Gas-Works, SLEAFORD.

Just published, price 1s.,
THE STORY
OF THE
RYDE GAS ARBITRATION.
By R. P. SPICE.
With a Plan of the Works.

DEDICATED
TO THE
DIRECTORS of the GAS COMPANIES
AND THE MEMBERS OF THE
LOCAL BOARDS OF THE UNITED KINGDOM,
BY THEIR HUMBLE SERVANT,
THE AUTHOR.
21, PARLIAMENT STREET,
Aug. 12, 1872.

London: EDWARD STANFORD, 6 & 7, CHARING CROSS, S.W.
Ryde: E. & M. A. GIBBS, UNION STREET.

GAS APPARATUS ON SALE.

FOUR Purifiers, 10 ft. by 4 ft. each, with centre-valve, 8-in. connexions, complete. Also a STATION-METER, capable of passing 3600 feet per hour. The whole about to be replaced by larger apparatus; are in good repair.
Apply to ED. RIPLEY AND SON, Bowling, near BRADFORD.

THE Widnes Local Board is prepared to receive TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR to be produced at their Gas-Works for the period of One year, commencing from the 1st of October next.
For particulars, apply to the undersigned, at the Gas-Works, WIDNES.
Tenders to be delivered on or before Saturday, the 5th of October, addressed to the Chairman of the Gas-Works Committee, and endorsed "Tender for Tar or Ammoniacal Liquor."
The Board does not bind itself to accept the highest or any tender.—By order, T. A. DREW, Manager, &c.

MANUFACTURE AND DISTRIBUTION ACCOUNTS.

Mr. W. J. WARNER
Begs to say that in consequence of the number of inquiries he has received relative to the above form of Accounts, which he had the pleasure of submitting to the
BRITISH ASSOCIATION OF GAS MANAGERS,
AT THEIR LATE MEETING IN DUBLIN,
he has been induced to publish them, and is now prepared to supply the two sheets, post free, for 5s.
Applications to be made to
MR. W. J. WARNER,
Engineer,
GAS-WORKS, SOUTH SHIELDS.

Mr. ALFRED LASS,
27, WALBROOK, LONDON, E.C.,
Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.
To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.
To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.
Offices: 22, Coleman Street, LONDON, E.C.

J. T. B. PORTER & A. SILVERTHORNE, C.E., 1, Westminster Chambers, LONDON, S.W., Consulting Engineers.
Corporations and Companies advised on all matters connected with Gas and Water Works.

NOTICE OF REMOVAL.

ROBERT P. KEYS, Accountant and Auditor (Author of the "Meter Life Book"), Removed to 52, CLIFTON STREET, late 1, Worship Square, FINSBURY, E.C.
Secretaries of Gas and other Companies assisted on moderate terms in making up their Books and Balance-Sheets.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
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"Dear Sir,—I am pleased to bear testimony to the great superiority of your Patent Double-Clip Lamp over those we have hitherto had in use. Nearly twelve months ago I had 72, and they have given me perfect satisfaction in every respect. The free circulation of air, consequent upon the glass being placed in without putty, ensures a very and unusual steadiness of flame. There is a great saving in glass, as we now seldom get the glass broken, and the Frames are largely protected from the influence of the weather by the Clips. Altogether, I consider them better far and much more economical than those generally in use.—I am, yours faithfully,

(Signed) "THOMAS STONE, Engineer and Manager."

"Gas-Works, Wellington, Somerset, April 26, 1872.

"Dear Sir,—Your Patent Double-Clip Lamp is much approved, both by my Directors and the Public Gas Inspector; of neat appearance, well ventilated, but few breakages, easily repaired, and that by the Lamplighter himself, requiring no putty; and as they can be made of any size, and to any pattern, they leave but little to be desired in a public street lamp.—I am, dear sir, yours very truly,

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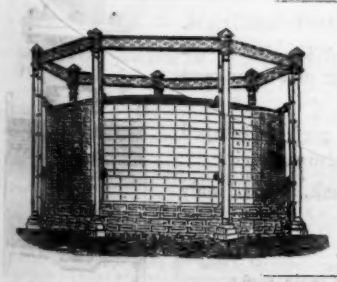

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CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

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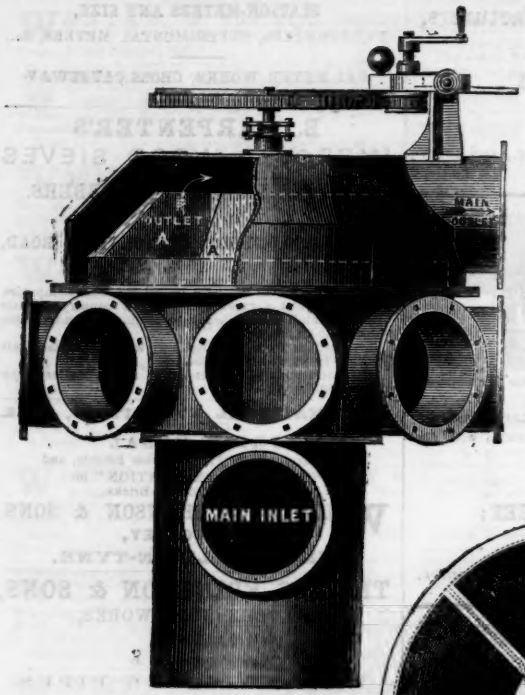
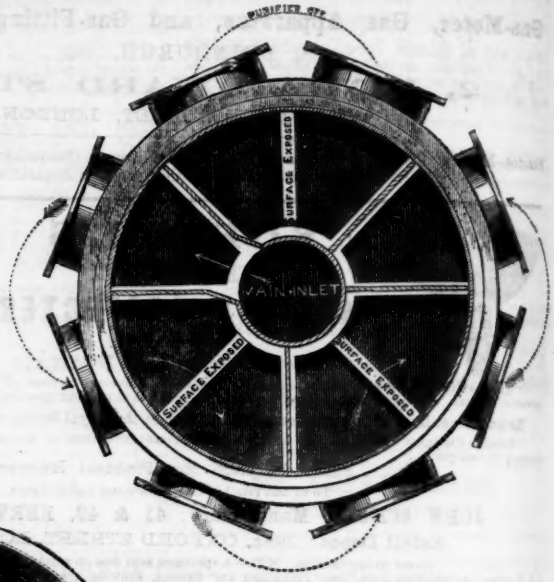
These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.

N.B.—Specimens sent free on application.

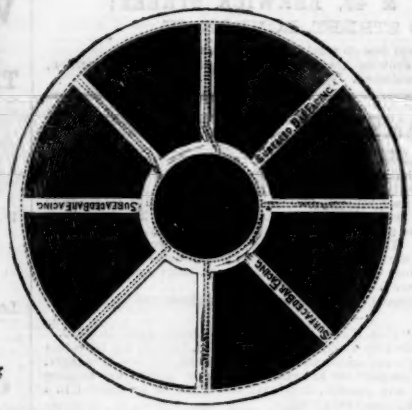
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



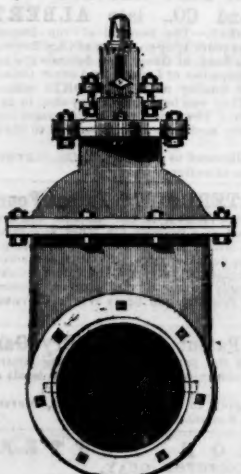
Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



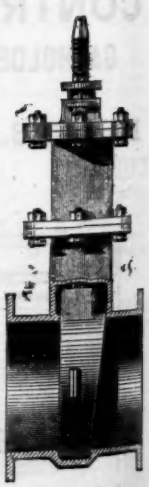
Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.



C. & W. WALKERS'
DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

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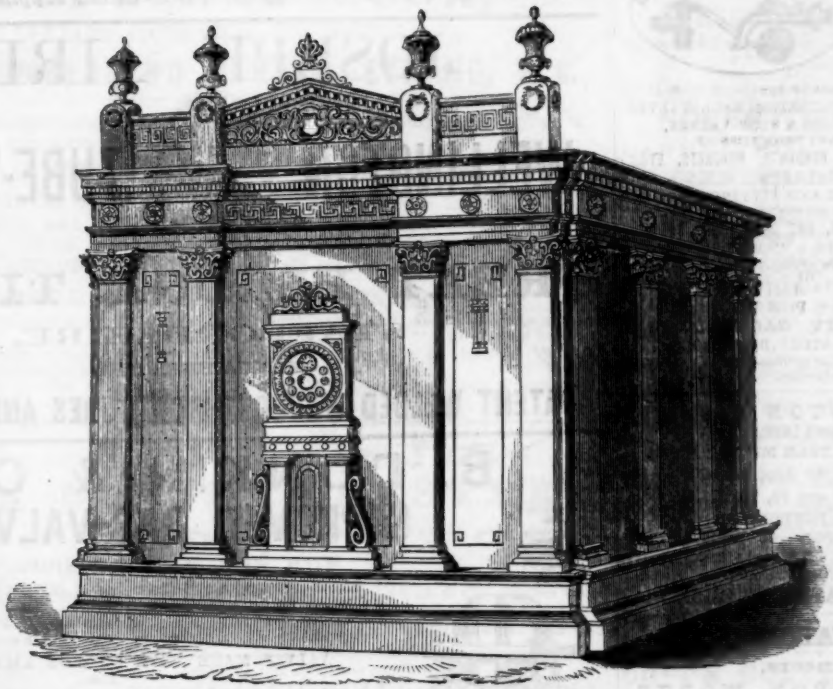

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"*Gas-Works, Bury St. Edmund's, Oct.* 24, 1870.

"Dear Sir,—In answer to your inquiry about Edge's patent method of scurfing Retorts, I beg to inform you that I can give it my unqualified recommendation.

"Some years ago, in order to facilitate the scurfing process, I introduced open-ended Retorts here, and found them a great improvement upon the common Retorts, which, in addition to the damage they received at scurfing times, were very leaky for several days afterwards. Even with that plan there was a considerable amount of labour and care, which I have avoided since the adoption of Edge's method.

"I find the amount paid for royalty less than the entire cost of open-ended Retorts; and in addition, that less labour is required and less damage is done to the Retort in scurfing.

"As Edge's method does not burn the carbon out of the cracks so much as most other plans, and my stokers are pleased with it, I regard it as invaluable in reducing one of the anxieties of the gas manufacturer.

"Having a steam-engine on the premises, it was easy of adoption here, but my opinion of it is so high that I would recommend all gas managers who are not so situated, to provide themselves with a portable steam-boiler, and am sure that they will never regret the investment.—I am, dear sir, yours truly,

"E. Goddard, Esq." "THOS. H. METHVEN.

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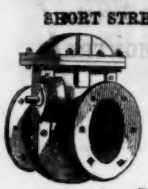

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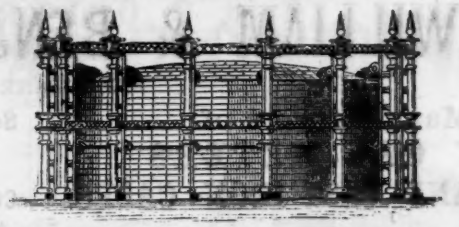

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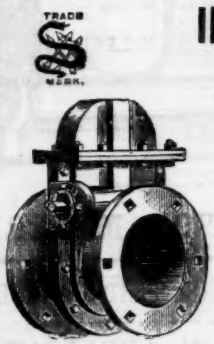

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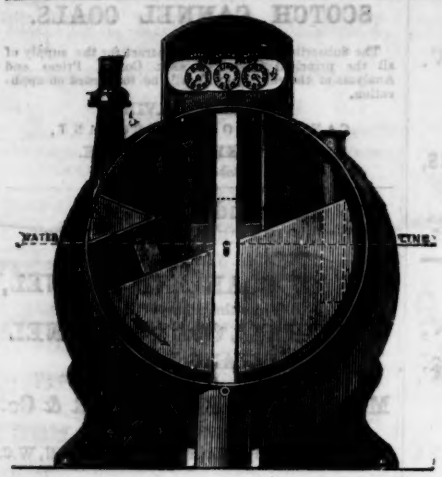

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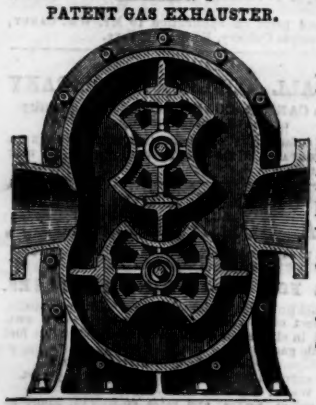

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